Railway Age Gazette

Including the Railroad Gazette and the Railway Age

PUBLISHED EVERY FRIDAY AND DAILY EIGHT TIMES IN JUNE, BY THE
SIMMONS-BOARDMAN PUBLISHING COMPANY,
83 FULTON STREET, NEW YORK.

CHICAGO: 417 South Dearborn St. CLEVELAND: Citizen's Bldg.
LONDON: Queen Anne's Chambers, Westminster.

E. A. SIMMONS, *President.*
L. B. SHERMAN, *Vice-President.* HENRY LEE, *Sec'y & Treas.*
The address of the company is the address of the officers.

EDITORS.
SAMUEL O. DUNN, *Editor.*

ROY V. WRIGHT, *Managing Editor.*	H. H. SIMMONS	F. W. KRAEGER
W. E. HOOPER	H. F. LANE	A. D. CLOUD
B. B. ADAMS	R. E. THAYER	GEORGE L. FOWLER
E. T. HOWSON	A. C. LOUDON	WILLIAM FORSYTH
	E. S. FAUST	S. W. DUNNING

Subscriptions, including 52 regular weekly issues and special daily editions published from time to time in New York, or in places other than New York, payable in advance and postage free:

United States and Mexico.....$5.00
Canada 6.00
Foreign Countries (excepting daily editions)..... 8.00
Single Copies .....15 cents each

Engineering and Maintenance of Way Edition and the four Maintenance of Way Convention Daily issues, North America, $1.00; foreign, $2.00.

Entered at the Post Office at New York, N. Y., as mail matter of the second class.

VOLUME 53. NOVEMBER 1, 1912. NUMBER 18.

CONTENTS

EDITORIAL:
Editorial Notes 821
"Land" 822
Sanitary Inspection of Cars and Stations by the Federal Government. 823
Chicago, Rock Island & Pacific.....824, 863
New Books 825

LETTERS TO THE EDITOR..... 826

ILLUSTRATED:
Agriculture, Manufactures and Railways..... 827
Reconstruction of Cumberland River Bridge; by Frank R. Judd.... 831
Railway Trunk Line Electrification; by N. W. Storer..... 836
"Contingent Schedules" on the Virginian Railway..... 840
Slater Front End..... 846

MISCELLANEOUS:
Railroad Clearing House Plan..... 835
The "Multi-Car" System 839
Density of Locomotive Smoke in Chicago..... 839
Inspection of Steel Rails; by Robert Job..... 843
Railway Electrical Engineers Association..... 845
"The High Cost of Railroading"..... 848
Foreign Railway Notes.....830, 834, 839, 844, 846, 847

GENERAL NEWS SECTION..... 849

THE railways of the United States have union stations in 135 of the 227 cities shown in the census of 1910 as having a population of over 25,000, and of the 50 cities in this list having a population of over 100,000, 40 contain union stations. In some cases it appears that the roads have been lavish in their provision of union stations, 35 cities being provided with two stations entered by more than one road, 8 cities with three such stations, two cities, Buffalo and Cincinnati, with four and Chicago with five. The four stations in Buffalo are used by 14 roads; the five in Chicago by 26 roads, and the four in Cincinnati serve only 10 roads. There are 22 roads in the union station in St. Louis, the largest number of roads entering one station in the country. Peoria, Ill., ranks second to St. Louis in this respect, with a station which serves 12 roads. There are 112 union stations in the country used by only two roads, comparing with 91 used by three or more. The geographical location of the cities having union stations is indicated by the fact that there are as many cities in the states of New York, Pennsylvania and Illinois which contain union stations as in all the states west of the Mississippi river. The state of New York leads in this respect, having 15 cities with union stations. Pennsylvania is a close second with 12 cities. The above figures show that the extent to which American railways have gone in combining their station facilities is greater than is commonly realized.

A STUDENT of locomotive design and operation, who has closely followed the development of locomotives for many years, made the statement recently that the improvements which have been made in locomotive design and construction in the past few years make it possible for a locomotive of the same size to haul 25 per cent. more tonnage now than five years ago. This improvement consists in the introduction of types which are better suited to the conditions under which they operate, to the more intelligent design of locomotive proportions and to the addition of devices which add to the efficiency and capacity of the locomotive. Some few roads, at least, have recognized the necessity of carefully analyzing the conditions under which the new power which they expect to order is to be used and have either added new types of locomotives to their standards, or have improved or modified their standard types. Other roads—neglecting to make a proper study of the conditions—have ordered certain types of locomotives, because they were popular, when they would have done far better to have improved one of their standard types. For instance, many Pacific type locomotives are being used, where a properly designed Atlantic type would give better results. Mallet locomotives are giving wonderful results under certain conditions to which they are adapted, but in one or two cases where they were adopted, apparently largely because of their popularity, they have not been able to give a very good account of themselves. For a powerful sustained high speed freight service the Mikado with its great "lung capacity" is just the thing, but for heavy slow freight service the consolidation, if properly proportioned and equipped with modern devices, such as are used with up-to-date Mikados, will undoubtedly give remarkable results. One road which equipped its standard consolidation locomotive with superheaters and brick arches found it possible to increase the tonnage ratings 15 per cent. Too much attention cannot be given on the part of railroad officers to the intelligent study of the conditions under which the locomotives are used, with the idea of better proportioning and designing new power to fit these conditions.

A FOREIGN railway officer, who has recently spent considerable time in visiting with railway officers in this country and studying our methods, was very much surprised at the great amount of time which the heads of the mechanical department give to receiving railway supplymen. On railroads, in some at least of the foreign countries, the time of the active head of the mechanical department is believed to be entirely too valuable to be taken up with matters of this sort. The merits of the different devices are investigated by minor officers, or by a committee of such officers, and the head of the mechanical department bases his action on their findings. When we consider the tremendous responsibility which rests upon the average motive power department superintendent, and the need for greater efficiency in that department, it seems a shame that his time should be taken up in listening to the salesmen's arguments as to the merits of the various devices used on cars and locomotives or in the shop. One railway supply company, realizing this, recently wrote a note to a superintendent of motive power asking consideration for its product on a new lot of equipment which the road was about to order. This, in spite of the fact that the main office of the company was in the same city and that it would have cost only ten cents in carfare to send a representative to see him.

Here is an extract from the letter which the company received in reply:

I wish every supplyman had been as thoughtful as you and had written to us instead of calling on us.

We have now gotten to the point where we have to restrict callers between 10:30 and 3:30, cutting out our lunch time to listen to the other fellow, which is only due him because he has paid good money to come to town for that purpose.

If you see fit to advocate to the supply fraternity in general, the fact that the poor railroad dub has something to do besides listen to some fellow who wants to sell something, it would help us both.

In the death columns you often read "Other papers please take notice"; you can disseminate this if you will and ask the other fellow to please take notice.

The motive power department head is not a detail man; he must be a big, broad executive, if he is to win out, and must leave a very large percentage of the detail work to capable subordinates. His problem is not to examine into the advantages of a certain detail part of the equipment, but to develop his staff so that he can rely on their judgment and recommendations concerning these details. The practice of years cannot be broken down in a few days, but if the mechanical department officers are to be successful they cannot afford to be hampered by matters of this sort, and the wise supplyman will do well to co-operate with them in such a way as to conserve their time and efforts.

THE letter from Wilbur E. Warr, editor of the Ludington (Mich.) *News,* published on another page, expresses accurately the reason for much of the misunderstanding and bad feeling between the railways and the public, and especially between the railways and the newspapers. Every one who has had newspaper experience knows that railway officers have often shown a surprising lack of appreciation and understanding of the benefits of favorable, and of the disadvantages of unfavorable publicity, and a remarkable capacity for "getting in wrong" with the press On the other hand, in many cases the plan suggested by our correspondent has been followed. Many roads have employed experienced newspaper men to cultivate friendly relations with the papers in their territory, and many railway officers themselves have tried to do the same thing, both in a personal way and by helping the newspaper men to get real news as distinguished from "press agent stuff" or advertising. In some localities this has had its effect, and many of the smaller papers have undoubtedly appreciated the willingness shown to make public the facts about the railway business. In the case of the large dailies in the cities where most of the general offices of the roads are located, the pressure for space is greater and the railway publicity man is liable to be *persona non grata.* Moreover, railwaymen often find that the establishment of pleasant relations with those who gather railway news may be of little avail, unless like relations can be established with the men who sit within the four walls of the newspaper office and edit the news. There is no doubt that the attitude of the public toward the railways might be improved somewhat if all the roads would furnish the papers with prompt and accurate news, whether regarding accidents or anything else, in place of following, as many still do, the antiquated policy of trying to mislead the reporter or leaving him to guess at the facts. Unfortunately, however, it is too commonly the case that the headlines and the reporter's story present one version, and the company's official statement giving another and correct version is appended only for the apparent purpose of showing how much the paper thinks the company has tried to conceal. Then, there are many and varying ideas as to what constitutes news. The railway officer or publicity agent is exceedingly liable to find, especially in large cities, that anything unfavorable to the railways is regarded in newspaper offices as news, while anything favorable to them is regarded as advertising or "P. A. stuff." Our correspondent says: "The people keep howling about the railways and the newspaper man sees that is what they want." Do the newspapers give their readers the kind of news about railways that they do because the people keep on howling about the railways, or do the people keep on howling about the railways because of the kind of news that the newspapers give them? How our correspondent would answer this question is perhaps shown by an editorial in his own paper which has come to hand since the foregoing was written. A paper at Traverse City, Mich., castigated the unfortunate Pere Marquette because it had taken off during the winter season two trains that didn't pay. The Ludington *News,* in a scorching reply to these criticisms and an effective defense of the road, says: "It is just such newspapers as these that are causing a great deal of trouble in this country today—papers that jump into something they know nothing about simply because they think that it is the proper thing to do."

"LAND."

THE following brief editorial under the caption "Land" appeared in *Collier's Weekly* for October 26:

Before the community reaches a final settlement of the monopoly problem, it will have to include a radical change in methods of taxation, and this will include a great change in the view of public and private rights in land and in what lies in the earth. Any unearned increment, whatever its nature, fails to suit the modern conscience, and ultimately it is likely to go.

These statements gather special significance from the interesting and instructive study recently made by the Bureau of Railway Economics, entitled "Comparison of Capital Values—Agriculture, Manufactures and the Railways," which is abstracted elsewhere in this issue. It shows that the increase in the capital value of agricultural property between 1900 and 1910 was 100.5 per cent. A small part of this increase was due to improvements in the land. Much the greater part came about thus: The development of industry and transportation, accompanied by a disproportionate growth of urban population, caused the demand for agricultural products to increase faster than the supply. The prices of these products were thereby greatly enhanced. This raised enormously the profitableness of owning and farming agricultural land. And this increased the value of the land itself. In other words, the great bulk of the increased capital value of agricultural property is "unearned increment." In it is to be found the greatest mass of unearned increment in this country—perhaps in the world. And *Collier's Weekly* says that *"Any unearned increment, whatever its nature,* fails to suit the modern conscience and ultimately it is likely to go."

The question was long since raised as to whether the railways are entitled to have the "unearned increment" in their land included in valuations for the purpose of rate regulation. There is absolutely no difference in economics, morals or law between the "unearned increment" in a railway's land and the "unearned increment" in a farmer's land. Therefore, there is no warrant in economics, morals or law for applying different rules to them. Either both the farmer and the railway have, or neither the farmer nor the railway has, a right to benefit by the unearned increment. *Collier's Weekly,* unlike most of those who discuss this question from the more radical second point, is consistent. It would meet the dilemma by having the public take the unearned increment in both cases.

This is exactly the conclusion to which logically leads much of the contemporary reasoning regarding the relative rights of those who have and those who have not. We do not question—here—the correctness of the reasoning or the justice of the conclusion. We simply call attention to the fact, to which *Collier's* comments draw sharp attention, that the Haves are pretty much all in the same boat; and that when the boat is rocked too violently, no matter by whom, they all—railway stockholder, owner of city real estate, farmer, butcher (alias packer), baker and candlestick maker—stand about an equal

chance of getting a ducking. The socialist spirit first directs its attack against public utility corporations. But it does not stop there by a long way. *Vide* the foregoing from *Collier's.*

By the way, how much of the value of *Collier's Weekly* is due to the ability and enterprise of its proprietors, and how much to the "progress of society?" Its value depends on its earnings, its earnings on its advertising and circulation, and in a barbarous state of society it would have neither circulation nor advertising. Therefore, its entire value, like "unearned increment," is due to the progress of society; it "fails to suit the modern conscience, and ultimately it is likely to go." Is there any flaw in this reasoning? There is; and because it applies to *Collier's Weekly* that paper will be able to detect it. There is nothing easier for a social reformer to do than to give good reasons why he should be allowed to share in the property of others—unless it be to give good reasons why others should not be allowed to share in his property. The difference between the modern socialist and the modern social reformer of the *Collier's* school seems to be this: The socialist wants the public to take over all the facilities of production, distribution and exchange, while the social reformer wants it to take over all the facilities of production, distribution and exchange except his.

SANITARY INSPECTION OF CARS AND STATIONS BY THE FEDERAL GOVERNMENT.

THE Secretary of the Treasury has issued an order requiring all commissioned officers of the Public Health and Marine Hospital Service, when traveling on official business, to inspect, from a sanitary standpoint, the cars and vessels on which they travel and the stations, docks, etc., at which they stop, confining the inspections, of course, to lines engaged in interstate commerce. The findings are to be reported to headquarters at Washington. In making these inspections everywhere in the United States the federal government will be undertaking a rather novel function; though in yellow fever epidemics, officers of the United States have made such inspections many times.

The department has had under consideration an order forbidding the use of public drinking cups on all cars and boats used in interstate passenger traffic; but the report that such an order has been issued is premature. The officers of the Treasury Department say that there is no question of their power under the constitution and the statutes either for inspection for nuisances, or to prohibit common drinking cups.

It is, unfortunately, quite true that filthy water closets and other "toilet" facilities are very common both on trains and at stations. Many superintendents and station masters maintain a tolerable degree of respectability in this matter, and some a high degree; but failures to maintain even a decent standard are very common. The writer of these lines determined at the beginning of the past summer to note, and perhaps publish, the names of stations observed on his travels, which in this matter were worthy of commendation; but the list proved to be so short that he had not the heart to print it; and his journeys were neither short nor infrequent. This subject has been dealt with in these columns many times. There can be only one satisfactory standard of cleanliness; and that is the highest. There is nothing more instructive or profitable to say today than was said by Charles Paine twenty-eight years ago, in his "Elements of Railroading" (1884). Extracts from that work were printed in the *Railway Age Gazette,* August 26, 1910. Mr. Paine told how to maintain cleanliness and he set forth vividly the results of neglect; but he did not tell the superintendent how much force and grit would be required to secure satisfactory results.

As we find filthy accommodations in stations and on trains which are in charge of superintendents who understand, appreciate and maintain satisfactory standards of neatness in this matter *except* in cars and stations, we are forced to conclude that they have not as yet succeeded in managing their stations and trains (as regards this feature) except on the cold financial basis. Apparently it is decided that the receipts are not sufficiently above the expenses to warrant any additional expenditure in this matter, and there the matter rests. For it is true that keeping water closets always clean costs money and thought. Caretakers have to be prodded constantly. Where the station agent is his own janitor, as is the case at many small stations, the need of having an inspector from some other place is to be accepted as an essential element; and the superintendent must take this into account.

What can the government do? No reasonable railroad officer can complain at governmental inspection in this matter, for reports of faulty conditions, if made in a reasonable manner, are invited from all passengers. Moreover, we may say that, as many dissatisfied passengers will neglect to inform the railway company of their dissatisfaction, the government inspection may be called a useful public function. But the inspection of 250,000 miles of railway is a vast undertaking, and what the Treasury Department is now doing can only scratch the surface. The real burden still remains on the shoulders of the railway superintendent. If he waits for the government to set him right he will make very little progress.

The great majority of the nuisances under discussion are an offense to the eye and nostril, though probably not dangerous to the health of passengers. To extend the power which the government exercises over hygienic matters to cover those which are in the realm of esthetics would be an unwarrantable stretching of the language of the law; but it will perhaps do no harm if a government physician complains of a nuisance as dangerous when in reality it is only an offensive sight or smell. It is true enough, we are sorry to say, that thousands of such offenses have gone on unrelieved year after year; and perhaps it may be that the severe methods of the federal guardians of the law are the thing needed to start a reform. We say this in spite of the fact that physicians holding positions of authority have in many cases gone to extremes in their laudable endeavors to conserve the public health and to instruct people who travel in the proper method of guarding against dangers which the average passenger, in his ignorance, overlooks in the most careless manner. In the discussions a few years ago concerning the dangers of tuberculosis in cars, especially sleeping cars, the medical men, it seemed to us, often thwarted their own purposes by insisting on such a high standard of precaution that no railway could live up to it. Evidence of actual infection in cars was extremely scarce, if not entirely lacking, and it was the views of more moderate physicians which finally prevailed.

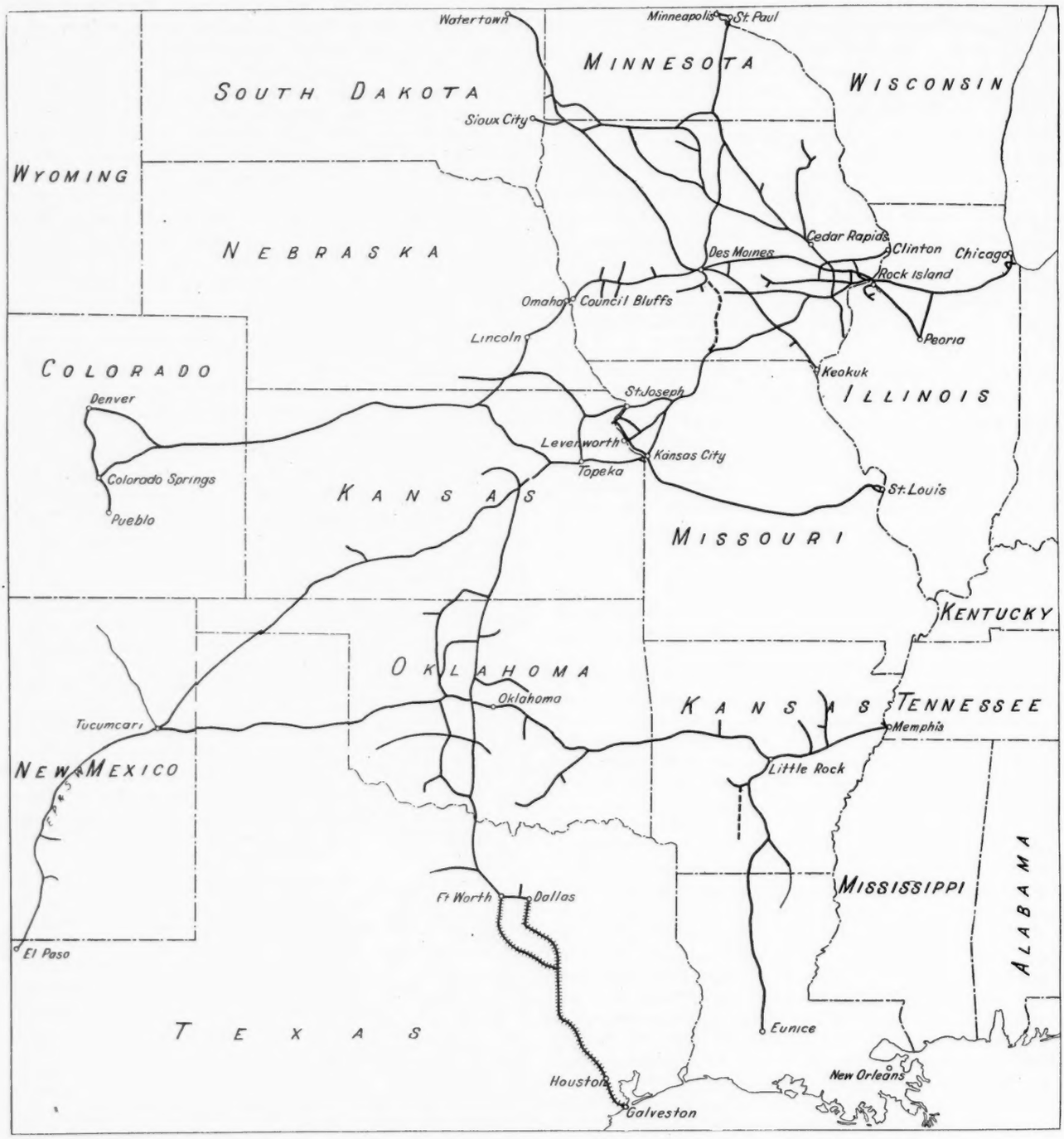
The condemnation of common drinking cups has produced grotesque results. Legislatures jump at the chance to pass a law which seems calculated to do good, especially when the burden of carrying out the law will fall on a railroad company; but the results of these laws bear no relation to their cost. At the recent hygienic congress in Washington the statement was made that of 75 samples of water taken from railroad trains only a third were fit to drink, and the question naturally arose whether the cup was not receiving disproportionate attention. As one observer remarked, "What one drinks is a good deal more important than what one drinks it out of." Infection from drinking cups is more a matter of theory than of fact. Again, in reading this statement, one naturally raises the query, what is meant by "unfit" water? Were those 50 samples all dangerous, or were they only unpleasant by reason of mud, or lime or some abnormal taste or smell? Any railroad which is able to run presentable passenger cars ought to be able to get and furnish clean and palatable, as well as safe, water; and no apology can be made for those which fail to do this; but in discussing public regulations and legal restrictions, it is important to say precisely what we mean.

CHICAGO, ROCK ISLAND & PACIFIC.

THE Chicago, Rock Island & Pacific Railway Company, which is the company that owns the greater part of and operates all of the 8,036 miles of line generally spoken of as the Rock Island Lines, is in the peculiar position of having its dividend requirements so insistent as to amount in a way to a fixed charge. Of course, if the Railway company did not pay its dividends, there would be no receivership of the Railway company; but to fully understand the showing made by this operating company in 1912 and why it is so important that this company maintain without interruption at least 5 per cent. dividends, it is necessary to explain quite fully the relation of the Railway company, the Chicago, Rock Island & Pacific Railroad Company and the Rock Island Company.

The Railroad company owns nearly all of the Railway company stock, and its stock is in turn owned by the Rock Island Company. The Railroad company has issued $71,354,000 4 per cent. bonds, due 2002, and depends on its income from the Railway company's dividends to pay interest on these bonds. This interest calls for an amount about equal to 5 per cent. on the stock of the Railway company. If, therefore, the Railway company were to temporarily pass its dividends, the Railroad company would be compelled to default interest on its bonds and a receivership of the holding company would be the logical consequence.

In the fiscal year ended June 30, 1912, the Chicago, Rock Island & Pacific Railway had to contend with quite unusual difficulties. Crops in parts of its territory were bad and weather



The crosshatched line is the Trinity & Brazos Valley in which the Rock Island has a one-half interest.

The Chicago, Rock Island & Pacific.

conditions were quite unusually bad. The C., R. I. & P., spread out as it is from Texas and Louisiana to Minnesota and South Dakota, was hit on its northern lines by the great severity of the winter weather, and on its lines extending into the Mississippi valley by the floods. Some idea of the severity of the winter and what this meant may be gathered from the fact that removal of snow, sand and ice cost 395 per cent. more in 1912 than in 1911. The Rock Island spent $47,600 on this account in 1911, and $235,300 for the same account in 1912.

Total operating revenues in 1912 amounted to $64,713,000, which is less by $3,775,000, or 5.51 per cent., than operating revenues in 1911. Under the weather conditions such as prevailed, it was impossible to reduce transportation expenses, which in 1912 amounted to $26,211,000, as against $26,171,000 in 1911. The company, therefore, was forced into a reduction of maintenance expenses, which reduction amounted in maintenance of way and structures to 12.78 per cent., and in maintenance of equipment to 11.26 per cent. There were pretty surely certain economies in maintenance of way and probably in maintenance of equipment; but a great part of the reduction in expenses is due to an actual cutting down in appropriations for maintenance, and in part may be considered as deferred maintenance. Maintenance of way and structures per track mile, excluding sidings and switch tracks, cost $1,072 in 1912 and $1,246 in 1911. Repairs, renewals and depreciation, exclusive of overhead charges, cost in 1912 $2,463 per locomotive, as against $2,617 in 1911; $692 per passenger car, as against $882 in 1911, and $66 per freight car, as against $80 in 1911.

The Rock Island Lines were in very good physical condition at the beginning of the fiscal year. Ample expenditures had been made not only for upkeep, but for additions and betterments to the property; for the raising of standards; the changing of wooden structures to permanent structures, and for the work that had been done in laying heavier rail and ballast. When a property is in such good physical shape as this, it is possible to make quite a reduction in maintenance appropriations for one year without seriously affecting the standards of upkeep or the condition of the plant. It is, however, in the long run generally expensive. If the management has any choice in the matter, it is almost always far more economical in the end to continue ample maintenance appropriations, even in the face of pretty heavy decreases in revenue. It might incidentally be mentioned here that this fact is a strong argument why railway companies should be cheerfully permitted by the Interstate Commerce Commission to charge such rates as will yield a margin of safety above a fair return on the capital invested. We are not for a moment trying to defend the capitalization of the Rock Island Company; but the Railway company itself is conservatively capitalized and the 5 per cent. earned on its stock, after the very severe economies of 1912, is not an adequate return on the money actually invested.

After the payment of 5 per cent. dividends in 1912, comparing with 5¼ per cent. paid in 1911, the C., R. I. & P. had a surplus of $107,000, as compared with a surplus in 1911 of $1,512,000. During the year the railway company sold $20,000,000 20-year debenture 5 per cent. bonds and $2,500,000 first and refunding mortgage bonds. The net increase in funded debt was $21,028,000. The company spent $3,459,000 on capital account, which includes expenditures for additions and betterments to road, amounting to $3,283,000, and the remainder was spent for equipment, and additions and betterments to subsidiary companies. Cash on hand increased from $3,242,000 at the end of 1911 to $15,074,000 at the end of 1912, while total working liabilities amounted to $8,364,000 at the end of 1912, a decrease of $894,000 from 1911. The discount on securities sold, which amounted to $1,637,500, was charged directly to profit and loss, so that with sundry other adjustments through profit and loss, the credit balance to this account was reduced from $17,008,000 at the end of the year 1911 to $14,598,000 at the end of the year 1912.

There is no indication in the annual report that the failure to cut down transportation expenses in proportion to the reduction in business handled was due to any lowering of the standards of operating efficiency on the part of the management. The total ton mileage of revenue freight amounted to 4,599,000,000 in 1912, which was less by 2.53 per cent. than in 1911. With this decrease of 2.53 per cent. in ton mileage, there was a decrease of 3.75 per cent. in loaded car mileage, and of 9.85 per cent. in empty freight car mileage, and a decrease of about 6 per cent. in freight locomotive mileage. The revenue train load was 278 tons in 1912, as against 270 tons in 1911; and the total train load, including company freight, was 330 tons in 1912 and 320 tons in 1911. The average number of cars per freight train was 25.61, of which 18.36 were loaded and 7.25 empty.

The Rock Island earned $5,122 per mile in 1912. Its operating ratio was 72.26 per cent., and ratio of transportation expenses to total operating revenue was 40.50.

Of the total 18,969,000 tons of revenue freight carried in 1912, 31.56 per cent. was furnished by products of mines, 25.46 per cent. products of agriculture, 17.93 per cent. manufactures, 10.44 per cent. products of forests, 7.63 per cent. products of animals, and 6.54 per cent. L. C. L. merchandise. Nearly all of the products of manufactures furnished less tonnage last year than the year before, and the tonnage of lumber decreased from 1,805,000 tons carried in 1911 to 1,559,000 tons carried in 1912. The tonnage of bituminous coal, corn and mill products other than flour shows substantial increases over 1911.

Crop prospects are very good indeed in the territory traversed by the Rock Island; and with the heavy crop yields there is reported a substantial activity in nearly all the lines of trade, and the monthly earning statements of the Rock Island since the close of the fiscal year have shown substantial increases over the corresponding months of the previous year.

The following table shows the principal figures for operation in 1912, as compared with 1911:

	1912.	1911.
Average mileage operated	8,036	8,026
Freight revenue	$41,156,835	$43,368,396
Passenger revenue	18,609,408	20,240,528
Total operating revenue	64,712,853	68,487,473
Maint. of way and structures	8,493,346	9,738,016
Maint. of equipment	8,302,467	9,359,749
Traffic	1,981,399	2,007,150
Transportation	26,210,502	26,171,419
Total operating expenses	46,759,494	49,055,683
Taxes	2,752,861	2,708,651
Operating income	15,200,498	16,723,139
Gross corporate income	15,887,289	16,908,616
Net corporate income	3,850,396	5,442,714
Dividends	3,743,760	3,930,948
Surplus	106,636	1,511,766

NEW BOOKS.

Modern Organization. By Charles D. Hine. Published by the Engineering Magazine Company, 140 Nassau street, New York. 110 pages. Price $2.

This little book is a comprehensive exposition of Major Hine's theories of railroad management. In it is described in some detail the unit system of organization which, under the direction of Julius Kruttschnitt, Major Hine has established on the Harriman Lines. The chapters originally appeared in the *Engineering Magazine*, and various descriptions of the unit system have appeared at different times; but this is the first time that a comprehensive description of the unit system and exposition of the principles upon which it is founded has been published. As one would naturally have expected, Major Hine has not only made a clear statement of his philosophy, but has made an unusually readable book. His analysis of the fallacies that underly the "chief clerk system of government" is convincing, and his description of what is being done on the Harriman Lines to do away with this system is well worth careful study and consideration.

Letters to the Editor.

A NEWSPAPER MAN ON THE RAILWAYS AND THE PRESS.

Ludington, Mich., October 24, 1912.

To the Editor of the Railway Age Gazette:

Although I am not a railroad man, and know practically nothing about the business, I have for a long time been interested in what you might term the politics of the railroads. Of course you will be very indignant and say that there is no such thing as politics in the railroads, and to a great extent you are correct. While I am only a working man myself, pushing a pencil on a small daily paper for a living, I have for a long time felt that the railroads were very much abused and that they are themselves very largely to blame. The railroad companies have always been considered the pathfinders of progress. Through them the country has been built to what it is today, and yet today there is more public condemnation of anything pertaining to the railroads than there is against any other branch of American industry, simply because the railroads have not kept up with progress in public education as they have in mechanical lines.

You will say they have their advertising departments and their publicity bureaus, but from the viewpoint of a newspaper man who knows the public mind I say that these departments as they are now conducted are little better than useless, except to advertise California rates and new lands for settlers. What the railroads need is a campaign of education among the newspaper men. Not long ago there was a very slight wreck in the town in which I was then located. To get the information for my paper I went first to the superintendent of the yard in which the wreck occurred. I could get nothing. I then went to different men who had been on the train, employees of the road, and got the same answer. I finally had to get the story the best way I could, and very naturally it did not give the facts as they really were and did not do the railroad justice. This was a case where the railroad company needed education and the people could have had it at the same time. The company should have given some good reason for the accident instead of leaving me to work it out the best I could for myself. A little barnstorming show that is trying to get the people's dimes will carry a press agent whose duty it is to see that the public is given as much nice talk as it is possible for him to work off on the newspapers, and yet our railroad officials expect that they can get along without this newspaper help. In the old days of the pass the newspapers had a more friendly feeling than they have now, and when these matters came up and the railroads were interested the roads got a little better treatment. Now it is different. The people keep howling about the railroads and the newspaper man sees that it is what they want. Nobody connected with the roads says anything to him from their standpoint, and when he wants information he has to go through a performance that is worse than going to jail, and then perhaps he will not get it.

I have noticed the letters in your "Letters to the Editor" department, and that they have touched on points of interest to the railroad man, and always from the railroad man's point of view. Get a wider vision. Get the newspaper men to help you line up with the people where you belong. You will find them a decent bunch if you will treat them only half way decent, but you have got to have some one in touch with them, some one that will make them feel that you do not look on them as your worst enemy. As I said before, I am not a railroad man, but I will venture to say that I could change the public sentiment along any railroad in the country in a year's time, if I could talk personally with the newspaper men along the line. And any other newspaper man could do the same thing if he were given the support of the road in his work. Efficiency, speed, safety and comfort on the road and a heart to heart understanding with the people would be a great deal better than the fight and hatred now existing between them. I would like to see some real live railroad wake up and get in line with the modern methods of dealing with the public.

Wilbur E. Warr,
Editor, Ludington (Mich.) *Daily News*.

"GENERAL MANAGER" ON THE RAILWAYS AND LABOR AGAIN.

——, ——, October 23, 1912.

To the Editor of the Railway Age Gazette:

I see my letter in your issue of August 23, entitled "A General Manager's Remedy for Accidents," has started a controversy which is not altogether justifiable, and I wish to explain my statements in part.

As to W. G. Lee's opinion of what school I came from (see *Railway Age Gazette*, October 4, page 621), it is immaterial, but for his edification will say that thirty years ago I was a brakeman on one of the largest railroad systems, receiving a salary of $50 per month. I had to go when I was called, got no overtime, and used hand brakes and link-and-pin couplers exclusively.

I still contend that the superintendent should govern his division absolutely. While there will be some who will not do it with justice to all I contend that the evils will be less than under present conditions; and if a superintendent does not treat the employees right the management will no doubt find it out and put some one in charge who will.

You will note that in my original communication I did not advocate the reduction in pay of any employee, but said I would recommend paying the men as much or more than they are now receiving. Furthermore, it was not my desire that labor organizations be disrupted, but only restricted in their demands.

I do not blame them for getting what they have, but do blame the managers for permitting them to get it; and if they have received concessions they are not entitled to and which in any way tend to make the operations of railroads more dangerous to themselves or the public, I claim the time to correct it is now, and I do not see anything to be gained by putting it off.

I will venture to say that if conditions of employment now written into labor contracts or agreements were eliminated and the rate of pay per hour or mile were increased 10 per cent. most operating officials could show a decrease in operating expenses and greater efficiency and fewer accidents; and I would not expect a conductor to do anything but run his train, an engineer to do anything but run his engine, a fireman to do anything but fire, or a brakeman to do anything but brake, except in cases of emergency when all should join in protecting the interests of the company that was paying them.

If there is anything unreasonable in this I cannot see it.

I agree with Mr. Lee that in past years injustice was done employees at times by officers who had pets, but I think that is almost a thing of the past, as most officers on railroads now are too busy trying to operate the roads successfully to try to favor friends at the expense of the service. At least the evil would be much less than that caused by present conditions.

As to the remarks of the "Master Mechanic" in your issue of October 4, page 622, from my observation a master mechanic is always an assistant to the superintendent, or should be. However, I cannot agree with him in his statement that an engineer's education is or should be along mechanical lines entirely. While the mechanical education is necessary the education along transportation lines is more necessary than along mechanical lines. An engineer might be the finest mechanic in the world and the poorest locomotive engineer. For the above reasons it is very necessary that officers of both departments confer before an engineer is either employed or dismissed.

General Manager.

AGRICULTURE, MANUFACTURES AND RAILWAYS.*

A Study by the Bureau of Railway Economics of Capital Values and Net Return of Three Important Industries.

INTRODUCTION.

Agriculture, which includes the production of the food supply and in a measure that of the raw material of manufacture; manufacturing, which is the transformation of raw material into a partly finished state, or into the finished product itself; and transportation, which is the conveyance of materials and products, of passengers and the mails, are the principal industries of the United States, and in this country the most important factor in transportation is the railway system.

It is of the first importance to know what are the amounts of capital invested respectively in agriculture, manufactures, and railways, and the amount and rate of return upon such capital. The impossibility, however, of ascertaining with absolute exactness the amount of the investments that have been made in these widespread and ramifying industries becomes apparent at the beginning of the inquiry, as does also the inability to make a precise distinction between the amount of investment and present capital value. This is especially true of a new and growing country like the United States, where values often have literally sprung from the ground almost without the investment of capital, and where natural increment has accounted in large part for the current value of land. Even so, the study of capital investment and return, carried out with care and a full appreciation of the difficulties involved, leads to significant results.

First of all must be considered certain essential differences in the character of the capital of these respective industries.

Although buildings, improvements such as fences, drains, etc., and appliances, such as implements and machinery, are indispensable for farm cultivation, the productivity of farm land in the United States depends in greater measure upon the fertility of the soil than upon the utilization of invested capital. As a growing population demands more and more of farm products, the value of farm land rises as the population increases, especially if it lies contiguous to populous centres. Although the use of continually improving methods of cultivation increases the production of a given area and gives it a greater earning capacity, the declining yield after years of tillage makes necessary the increasing use of fertilizer, and thus tends to offset the larger earnings. Clearly, the land itself is the largest factor in the value of a farm, and the owner does not bring about that increase in value due to the growth of population, which is commonly designated as the "unearned increment."

Investment in a manufacturing plant includes the price paid for the land which forms the site, but the principal investment in the case of a plant of any magnitude is in the buildings and appliances in which and by means of which the processes of manufacture are carried on. In no small measure the return upon capital in manufacture depends upon efficient and economical methods, and upon skill in the designing and marketing of products for which there is demand. The value of the land may increase as other land in the vicinity becomes more valuable, and to this extent the value of a manufacturing plant may be enhanced by unearned increment. The buildings and appliances, however, tend to deteriorate as they are used, involving more rapid depreciation than is suffered by farm land because of tillage.

With a railway, as with a manufacturing plant, the land is an indispensable factor, and its value also enhances by unearned increment unless it be considered that it is largely because of transportation service that the value of adjoining land is enhanced, and that therefore in a measure the rising value of railway real estate is a reflex of the service performed by the railways. With a railway, as with a manufacturing enterprise, the principal investment is in the plant; in the case of the railway it is in the roadbed, cars and locomotives, buildings, and appliances. With a railway, as with a manufacturing plant, the return upon capital depends in no small measure upon efficient and economical methods of operation, and also upon the vigor with which traffic is secured and developed; and there is rapid depreciation.

Therefore there is a greater similarity between the railway and manufacturing industries than between either of these and the agricultural industry. A respect in which the agricultural distinctly differs from the manufacturing or railway industry is in the comparatively slight extent to which establishment as a "going concern" affects the capital value of the farm as contrasted with the considerable value which establishment as a going concern attaches to a manufacturing plant or a railway. A farm may change the character of its product or even lie fallow for a year or more without great deterioration in its capital value. This applies in far less degree to a manufacturing establishment, and it does not apply at all to a railway, which is obliged to continue its transportation service without cessation. The continuing organization necessary to such permanence as a going concern is alone a considerable factor in its value.

Certain localities, and even particular farms, may gain a distinctive reputation for the production of certain grades of fruits, of vegetables, of live stock, or even of grains which command preferential prices, but in the main the bulk of the products of agriculture are marketed without regard to the immediate locality or the particular farm whence they came. In the case of most manufacturing establishments the distinctive reputation for a particular kind and grade of production is an asset of great value.

So also with a railway company. While a considerable share of the traffic of every railway is non-competitive, there are but few of the railway systems of the United States, which are not dependent upon competitive traffic. In securing such traffic, and especially competitive passenger traffic, the reputation of a railway for efficient transportation is an asset of the highest value, and this reputation can only be gained through the development of an organization that must increase in efficiency.

Value as a "going concern" is therefore no doubt of some importance in the agricultural industry, but it is a prime factor in the aggregate value of a manufacturing establishment or of a railway. The amounts representing capital value used in this study, however, are the book values of the actual investment only, and contain no allowance for the value of patents, trademarks, good will, or establishment as a going concern.

NATIONAL WEALTH OF THE UNITED STATES.

Because of its significance in relation to this study there is here presented a comparative statement of the national wealth of the United States in 1890, 1900, and 1904 as estimated by the Bureau of the Census. The Census Bureau does not purpose to extend this investigation in the near future to include a period later than 1904.

ESTIMATE OF WEALTH: UNITED STATES.[a]

Subject.	1890.	1900.	1904.
Real property and improvements—taxed	$35,711,209,108	$46,324,839,234	$55,510,228,057
Real property and improvements—exempt	3,833,335,225	6,212,788,930	6,831,244,570
Farm implements and machinery	494,247,467	749,775,970	844,989,863
Live stock	2,308,767,573[b]	3,306,473,278	4,073,791,736
Manufacturing machinery, tools and implements	3,058,593,441[c]	2,541,046,639	3,297,754,180
Gold and silver coin and bullion	1,158,774,948	1,677,379,825	1,998,603,303
Railroads and their equipment	8,296,050,034	9,035,732,000	11,244,752,000
Street railways	389,357,289	1,576,197,160	2,219,966,000

*Abstracted from Bulletin No. 39 of the Bureau of Railway Economics, entitled "Comparison of Capital Values—Agriculture, Manufactures and the Railways."

ESTIMATE OF WEALTH: UNITED STATES.a—(*Continued.*)

Subject.	1890.	1900.	1904.
Telegraphs	701,755,712	211,650,000	227,400,000
Telephones		400,324,000	585,840,000
Shipping and canals		537,849,478	846,489,804
Pullman and private cars	.....	98,836,600	123,000,000
All other	9,185,000,400	15,844,413,661	19,300,132,897
Total	$65,137,091,197d	$88,517,306,775	$107,104,192,410

a Special Report of the Census Bureau on Wealth, Debt, and Taxation, 1907, pp. 27-29.

b This does not include the value of live stock in cities, towns and villages. The value of such live stock is included in the value of live stock for 1900 and 1904, amounting to about one-tenth of the total value.

c Including product on hand, raw and manufactured. These items are partially covered under the heading "all other" in 1900 and 1904.

d This total exceeds the total given on page 29 of the Census report by $100,000,000. The discrepancy is due to an error of addition in the original table prepared by the Census Bureau in 1890.

Inasmuch as the classification of items followed by the Census Bureau in preparing these estimates of national wealth varied somewhat for the respective years, the rates of increase are not strictly comparable throughout. They suffice, however, for the purpose of a broad and general comparison.

Therefore it may be noted that the augmentation in the total estimated wealth of the United States between 1890 and 1904 was $41,967,101,213. This was an increase of 64.4 per cent., or nearly two-thirds while the increase in the value of railroads and their equipment for the same period was $2,948,701,966, or 35.5 per cent. The rate of increase in the value of taxed real property and improvements from 1890 to 1904 was 55.4 per cent.; in the value of untaxed real property and improvements, 78.2 per cent.; in the value of farm implements and machinery, 71.0 per cent., and in the value of street railways, including interurban railways operated by electricity, 470.2 per cent. It will be noted that the value of the railroads, as shown by these reports of the Census, increased from 1890 to 1904 but little more than half as fast as the value of all property, and that the rate of increase in the value of every other form of property for which comparable values are available was considerably greater than in that of the railways.

CAPITAL VALUES OF THE AGRICULTURAL, MANUFACTURING, AND RAILWAY INDUSTRIES.

That the term "capital" as used in the reports of the Bureau of the Census on manufacturers refers to the estimated or book value of the property employed in the business is made clear by the explanation of the term in the instructions to the census enumerators. In 1910, for example, the instructions read as follows: *"Capital invested.* The purpose of this inquiry is to determine the value of property employed by the establishment for the purposes of its productive operation, but not including rented property. Patent rights and good will must not be considered as a part of the capital."

In its reports upon agriculture the Census Bureau uses the term "value of farm property" throughout, in preference to "capital" or "capital value." The value of farm property is the value placed upon it by the owner thereof, modified or adjusted in accordance with prevalent standard values.

The Interstate Commerce Commission has not attempted either to compute or to estimate the value of American railway property, but in its annual reports has shown the gross capitalization, the net capitalization, and the cost of road and equipment as reported by the railways. By "gross capitalization" is meant the total par value of outstanding stocks and bonds. "Net capitalization" is gross capitalization less such part of it as is held by the railways themselves. In other words, net capitalization is the total par value of stocks and bonds owned and held by the general public; that is, the amount of railway capitalization for which the railways are responsible to the public. Net capitalization stands therefore as a far better criterion of railway values than gross capitalization. The "cost of road and equipment" of the railways is the book value of road and equipment. No one of these three aggregates has exactly the same basis as the capital value reported for manufactures or the value of farm property reported for agriculture.

The close correspondence of the value of the railways as reported by the Census Bureau for the years 1890, 1900, and 1904 and as shown by the aggregate of their reports of "cost of road and equipment" to the Interstate Commerce Commission for the same years is made clear in the following table. It will be perceived that the valuation for 1904 is indicated at an almost identical amount by the respective authorities.*

Year.	Estimate of Census Bureau.	Reports of the railways to the Interstate Commerce Commission.
1890	$8,296,050,000	$7,755,387,000
1900	9,035,732,000	10,263,313,000
1904	11,244,852,000	11,511,537,000

The capital values of the agricultural, manufacturing, and railway industries in 1890, 1900, 1905, and 1910, except as noted, are given in the next table.*a* It must be borne in mind that the significance of these amounts is limited by the qualifications that have been specified. It is not possible to show manufacturing capital for 1890 on a comparable basis with that of 1900, 1905, and 1910; returns for that year in the case of manufacturers are therefore omitted. The reports of the Bureau of the Census are the source of the amounts for agriculture and manufactures; the reports of the Interstate Commerce Commission for the items in regard to the railways. For the railways there are given cost of road and equipment, gross capitalization, and net capitalization. It will be perceived that in each case the cost of road and equipment exceeds the net capitalization, which is the amount of capitalization for which the railways are responsible to the public. The two amounts for 1910 are almost identical. Because of its correlative interest, the population of continental United States in each of the census years 1890, 1900, and 1910 is shown in the table. A census was not taken of either agriculture or the population in 1905.

CAPITAL VALUE OF AGRICULTURE, MANUFACTURES AND RAILWAYS OF THE UNITED STATES.

	1890.	1900.	1905.	1910.
Agriculture	$16,082,267,689	$20,439,901,164	.....	$40,991,449,090
Manufactures	.....	8,975,256,000	$12,675,581,000	18,428,270,000
Railways:				
Cost of road and equipment	7,755,387,381	10,263,313,400	11,951,348,949	14,387,816,099
Gross capitalization	9,437,343,420	11,491,034,960	13,805,258,121	18,417,132,238
Net capitalization *b*	7,126,673,041	8,803,156,067	9,940,853,945	14,375,529,748
Population	62,947,714	75,994,575	.....	91,972,266

a In the tables of this study giving capital values the statistics presented for agriculture in 1890 and 1900 relate to June 1, and in 1910 to April 15. The statistics for manufactures in each case refer as nearly as possible to January 1, and the statistics for the railways to June 30.

b Up to 1906 the amounts representing net capitalization published by the Interstate Commerce Commission were incomplete to the extent that they did not include income bonds, equipment trust obligations, and miscellaneous obligations in the hands of the public.

The relative importance of the three industries in indicated by this table. In 1910, for example, using round numbers, the aggregate value of American farm property, including real estate, implements and machinery, and live stock, was reported at $41,000,000,000; the amount of capital invested in manufactures was reported as $18,500,000,000; while the total cost of road and equipment of the railways was reported at $14,400,000,000.

The rates of increase in the capital values thus reported, and of the population, are shown in the following table:

PERCENTAGE OF INCREASE IN CAPITAL VALUE.

	1900 over 1890.	1905 over 1900.	1910 over 1905.	1910 over 1900.
Agriculture	27.1	....	....	100.5
Manufactures	....	41.2	45.4	105.3
Railways:				
Cost of road and equipment	32.3	16.4	20.4	40.2
Gross capitalization	21.8	20.1	33.4	60.3
Net capitalization	23.5	12.9	44.6	63.3
Population	20.7	....	....	21.0

*It may be pointed out in this connection that the estimate made by the Census Bureau of railway valuation in 1904 was prepared under the supervision of joint officials of the Census Bureau and the Interstate Commerce Commission. This fact does not explain the close relationship between the cost of road and equipment of railways as returned to the Commission in 1904 and the valuation of railway property as computed by the Census Bureau for the same year. The former represents the value of railway property on the books of the railways themselves; the latter is a wholly original computation of the commercial valuation of railway operating property, arrived at by capitalizing the average net earnings of individual railways and railway systems. The complete difference of method utilized in reaching the respective aggregates for 1904 makes their close correspondence both striking and significant.

For the ten-year period, 1900 to 1910, the rate of increase in the capital value of agricultural property was 100.5 per cent., the rate of increase of capital invested in manufactures 105.3 per cent., and the rate of increase in the cost of road equipment of the railways 40.2 per cent. Gross capitalization of the railways increased 60.3 per cent., and the net capitalization 63.3 per cent. The greater percentage of increase in capitalization than in cost of road and equipment was largely due to the fact that railways to a large extent have not written up on their books the values of their real properties as they increased, and that they have invested large amounts in their properties which they did not charge to property account. For the preceding decade, 1890 to 1900, the capital value of agriculture increased at the rate of 27.1 per cent., and the cost of road and equipment of the railways at the rate of 32.3 per cent. That is, during the earlier decade agricultural value increased in a somewhat lower ratio than railway investment, while during the second decade the rate of increase was two and a half times as high for agriculture and over two and a half times as high for manufactures as for railways. The increases in the capital values of agriculture and of manufactures in this second decade were each more than 50 per cent. greater than even the increase in the capitalization of the railways.

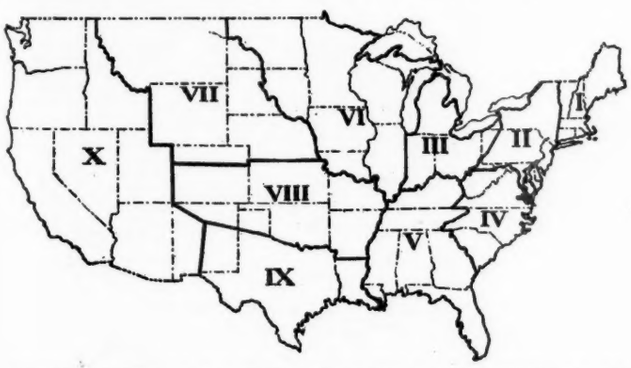
As an indication of the extent to which the capitalization of industries, *i. e.*, their outstanding stock and bond issues, exceeds their capital value as reported to the Census Bureau and embodied in this study the following comparison has been made by that Bureau of the two items for all the industrial combinations existent in the United States in 1900:*a*

Total capitalization authorized and outstanding	$3,093,096,000
Total capital, as reported to the Census Bureau	1,461,632,000

Thus the capitalization of these combinations was more than twice as great in amount as the capital value, represented by land, buildings, machinery, tools, and implements, cash, bills receivable, etc. The gross capitalization of the railways was about 12 per cent. greater than the cost of road and equipment in 1900, and 28 per cent. greater in 1910.

CAPITAL BY INTERSTATE COMMERCE COMMISSION GROUPS.

Statistics as to the cost of road and equipment of the railways are not available for the several states, nor for any geographical area less extensive than the United States as a whole. The Interstate Commerce Commission publishes annually the gross capitalization of the railways for each of the ten territorial groups defined at the time it undertook the compilation of railway statistics. These groups are numbered consecutively and comprise respectively the areas indicated in the following map:



Territorial Groups for Railways of the United States as Arranged by the Interstate Commerce Commission.

The gross capitalization of the railways of each of these ten territorial groups was as follows in the years 1890, 1900, and 1910:

RAILWAY GROSS CAPITALIZATION BY INTERSTATE COMMERCE COMMISSION GROUPS.

Group.	1890.	1900.	1910.
I	$377,477,302	$472,329,210	$799,627,536
II	2,032,242,616	2,337,874,067	3,543,053,383
III	1,309,390,715	1,490,997,662	2,414,370,374
IV	410,704,029	631,863,020	960,183,380
V	742,670,372	903,681,993	1,346,913,136
VI	1,818,588,865	2,024,541,064	3,102,203,094
VII	443,136,450	560,763,313	1,047,244,431
VIII	1,047,274,401	1,395,350,723	2,260,370,943
IX	372,982,285	511,034,132	808,905,131
X	882,876,385	1,162,599,776	2,134,260,830

To secure statistics of the amount of capital invested in manufactures and of the value of agricultural property that may be compared with these aggregates of gross railway capitalization by groups, it will be necessary to combine into corresponding groups the returns of agricultural and manufacturing values shown by states in the preceding tables. While the group lines do not in every instance follow state boundries, yet it will be possible to obtain a very close approximation to the several groups by including the returns of any state, parts of which are in different groups, in the returns of the group in which lies the greater part of its area. The results of this approximation are presented in the next two tables. The first gives the value of the farm property of each group in 1890, 1900, and 1910. This table covers farm property of all kinds, including land, buildings, implements, machinery, and live stock.

VALUE OF FARM PROPERTY BY CORRESPONDING GROUPS.

Group.	1890.	1900.	1910.
I	$585,267,817	$639,645,900	$867,240,457
II	2,637,796,896	2,567,765,165	3,317,411,784
III	2,712,949,906	2,867,896,151	4,800,688,206
IV	810,006,671	914,849,178	1,869,648,447
V	1,325,025,536	1,478,172,491	2,906,501,343
VI	3,654,365,065	5,694,326,155	11,515,526,346
VII	751,230,899	1,230,812,589	3,760,933,478
VIII	1,783,711,403	2,517,208,718	5,902,067,389
IX	662,574,109	1,161,013,179	2,519,866,152
X	1,159,339,387	1,368,211,638	3,531,565,488

The amounts of capital invested in the manufacturing industries of each group in 1900 and 1910 are shown in the following table:

CAPITAL INVESTED IN MANUFACTURES BY CORRESPONDING GROUPS.

Group.	1900.	1910.
I	$1,507,630,000	$2,503,854,000
II	3,656,526,000	6,848,361,000
III	1,037,226,000	2,393,397,000
IV	272,436,000	757,720,000
V	338,999,000	854,345,000
VI	1,241,148,000	2,612,048,000
VII	112,230,000	163,702,000
VIII	370,851,000	872,148,000
IX	164,530,000	438,692,000
X	273,680,000	984,003,000

The following table gives the rates of increase of the capital amounts set forth in the three preceding tables:

PERCENTAGE RATE OF INCREASE.

	1890 to 1900.		1900 to 1910.		
Group.	Agriculture.	Railways.	Agriculture.	Manufactures.	Railways.
I	9.3	25.1	35.6	66.1	69.3
II	*d*2.7	15.0	29.2	87.3	51.6
III	5.7	13.9	67.4	130.7	61.9
IV	12.9	53.8	104.4	178.1	52.0
V	11.6	21.7	96.6	152.0	49.0
VI	55.8	11.3	102.2	110.5	53.2
VII	63.8	26.5	205.6	45.9	86.8
VIII	41.1	33.2	134.5	135.2	62.0
IX	75.2	37.0	117.0	166.6	58.3
X	18.0	31.7	158.1	259.5	83.6

d Decrease.

It will be borne in mind that these tables by groups give railway gross capitalization only. Neither net capitalization nor the cost of road equipment are ascertainable for the respective groups. From 1890 to 1900 the gross capitalization of the railways increased in six of the ten groups at a higher ratio than the value of agricultural property. From 1900 to 1910, however, in all except Groups I. II, and III, where agriculture has not kept pace with other activities, the rate of increase in gross capitalization of the railways has been approximately one-half the rate of increase in the value of farm property. From 1900 to 1910 gross railway capitalization has increased in much lower ratio than the capital value of manufacturing, which is far less than

a See the report of the Census Bureau on manufactures, 1900, Part I, pp. LXXVIII-LXXIX.

the gross capitalization of the manufacturing industries. An exception is in Group I, and the only other exception in Group VII, where the development of railways has been especially necessary to serve the agricultural industries.

RETURN ON MANUFACTURING AND RAILWAY CAPITAL.

Even more difficult and uncertain than a comparison of the capital values of the agricultural, manufacturing, and railway industries is a comparison of the annual returns upon these capital values. Indeed, it has been found impracticable even to attempt an estimate of the returns from agriculture that would be suitable for such a comparison. In the case of manufactures and railways, however, the operating or running expenses and the taxes may be ascertained, and thus an approximation may be had to the net returns on capital. In this manner, for the following tables the gross and net value of the products of the two industries have been computed upon as nearly a comparable basis as possible. The net return has been ascertained by deducting from the respective gross value of products in the case of manufactures, and from gross earnings in the case of the railways, all operating expenses, including taxes. In each case, interest on capital is included in the net return.*a*

GROSS AND NET RETURNS FROM MANUFACTURES.

	1900.	1905.	1910.
Gross returns:			
Gross value of products.	$11,406,927,000	$14,793,903,000	$20,672,052,000
Expenses: *b*			
Cost of materials.....	6,575,851,000	8,500,208,000	12,141,791,000
Salaries and wages.....	2,389,132,000	3,184,884,000	4,365,613,000
Miscellaneous expenses, including taxes	905,442,000	1,453,168,000	1,945,676,000
Total	$9,870,425,000	$13,138,260,000	$18,453,080,000
Net return	$1,536,502,000	$1,655,643,000	$2,218,972,000

GROSS AND NET RETURNS FROM RAILWAY OPERATION.

	1890.	1900.	1905.	1910.
Total operating revenues	$1,051,877,632	$1,487,044,814	$2,082,482,406	$2,750,667,435
Expenses:				
Total operating expenses, including wages	692,093,971	961,428,511	1,390,602,152	1,822,630,433
Taxes	31,207,469	48,332,273	63,474,679	103,795,701
Total	$723,301,440	$1,009,760,784	$1,454,076,831	$1,926,426,134
Net return, including interest on capital	$328,576,192	$477,284,030	$628,405,575	$824,241,301

As has been specified in these pages, there have been variations in the requirements of the Bureau of the Census at different times for ascertaining the capital value of manufactures. Moreover, in computing such vast aggregates there is always the necessity for adjustments of one kind and another so that different persons may not always arrive at identically the same results in handling the intricate data. Indeed, the same person may be obliged at one time to give consideration to various factors that bring about results varying from those of a similar adjustment at another time. Furthermore, the income account here shown for manufactures differs from that of the railways in the fact that the reported railway returns represent cash actually received, while the reported value of products manufactured in any year is not only partially made up of cash already taken in, but is also in part an estimate of the probable market value of such portion of the product as is not yet sold, and in part consists of outstanding accounts the settlement of which may entail loss. In other words, the manufacturing returns are partially at least based on estimates. It therefore cannot be too strongly insisted that the tables and the deductions therefrom on the preceding pages are of broad and general significance only. It is believed, however, that possible variations, to whatever cause they may be due, do not impair such broad and general significance.

In the next table are set forth the capital values of the two industries, the return on capital as expressed in the preceding tables, and the percentage of that return. It will be perceived that the years for which there is available complete information that is approximately comparable for each industry are those designated as 1900 and 1910. These may be considered to mark the beginning and the end of a decade which comprised a fairly distinct industrial era. In 1900 the country was on the high tide of recovery from prolonged industrial depression; in 1910 it was enjoying exceeding prosperity, both the gross and the net earnings of the railways attaining a higher mark than for any preceding or subsequent year. It will be noted that in the case of the railways the percentage of net return is computed on the cost of road and equipment, which is the item comparable with the capital value of manufactures as given.

COMPARISON OF NET RETURNS ON CAPITAL.

	1900.	1905.	1910.
Manufactures:			
Capital	$8,975,256,000	$12,675,581,000	$18,428,270,000
Net return on capital.....	1,536,502,000	1,655,643,000	2,218,972,000
Per cent. of net return...	17.119	13.062	12.041
Railways:			
Cost of road and equipment.	$10,263,313,400	$11,951,348,949	$14,387,816,099
Net return	477,284,030	628,405,575	824,241,301
Per cent. of net return....	4.650	5.258	5.729

In 1900 the percentage of net return upon capital in manufactures was nearly four times as great as that on the cost of road and equipment of the railways. In 1905 it was two and one-half times as great.

From 1900 to 1910 the capital in manufactures increased 105 per cent., and the cost of road and equipment of the railways increased 40.2 per cent. In the latter year the percentage of net return on capital in manufacture was two and one-tenth times as great as that of the railways.

While these comparisons are subject to qualification, it is not believed that, were absolutely accurate and comparable data available, there would be more than a negligible change in the relation of these ratios of return.

CHINESE RAILWAY DEVELOPMENT.—Construction work on the line from Yunnan-fu, the capital of Yunnan province, China, to Nanning, the chief city and new capital of Kwangsi province, at the head of river navigation on the West river, will probably be begun in the near future. This line was proposed about two years ago and was approved by the Board of Communications at Peking. A survey was undertaken by K. S. Low, a foreign trained Chinese engineer. The capital was furnished by several wealthy Chinese citizens of the West river country and a survey party was in the field for about a year. The coming of the revolution prevented any definite advance of the work beyond the survey stage. The authorities of Yunnan province have now taken the matter up in earnest and have placed the construction of the line from Yunnan in the hands of the American engineer, who has been chief of the party surveying the line from Yunnan-fu to the Yangtze river and other lines in Yunnan province. It is understood that the entire scheme is being taken up by the respective Kwangsi and Yunnan interests with a view of immediate progress.

a In the following discussion of net returns, the statistics of manufacturing products cover as nearly as possible the calendar year preceding the census year, while the statistics of railway operating returns apply to the fiscal year ending June 30 of the census year. Thus the product manufactured during the calendar year 1909 was that covered by the census of 1910, and is here discussed under the latter year; with the manufacturing returns for the calendar year 1909 are compared the railway returns for the fiscal year ending June 30, 1910.

b It should be pointed out that the item "salaries and wages" does not include salaries paid to proprietors or firm members interested in non-corporate manufacturing establishments. There were 273,265 of these proprietors and firm members in 1910 for whom no definite salaries were reported. The railways are virtually all owned by corporations, all employees from president down being paid a definite salary or wage. To some extent, therefore, the expenses shown for the manufacturing and railway industries are not comparable. On the other hand, non-corporate manufacturers produced in 1910 only one-fifth of the total value of products manufactured in that year, while the average size and importance of the individual non-corporate establishment was so small that the return to the proprietor or firm owner could not be differentiated between wage and profit.

Depreciation of the road and equipment of railways is, under the accounting system prescribed by the Interstate Commerce Commission, provided for through the operating expense account. The practice of manufacturing establishments in regard to depreciation of plant is not uniform, but it may be supposed that prudent management will, in the long run, charge the cost of repairs and replacement (which may be said to stand for a depreciation account where no such definite account is maintained) to running expenses.

RECONSTRUCTION OF CUMBERLAND RIVER BRIDGE

Details of the Flood Conditions, the Strengthening of the Old Piers and the Erection of the New Spans.

By Frank R. Judd,

Assistant Engineer, Bridge Department, Illinois Central.

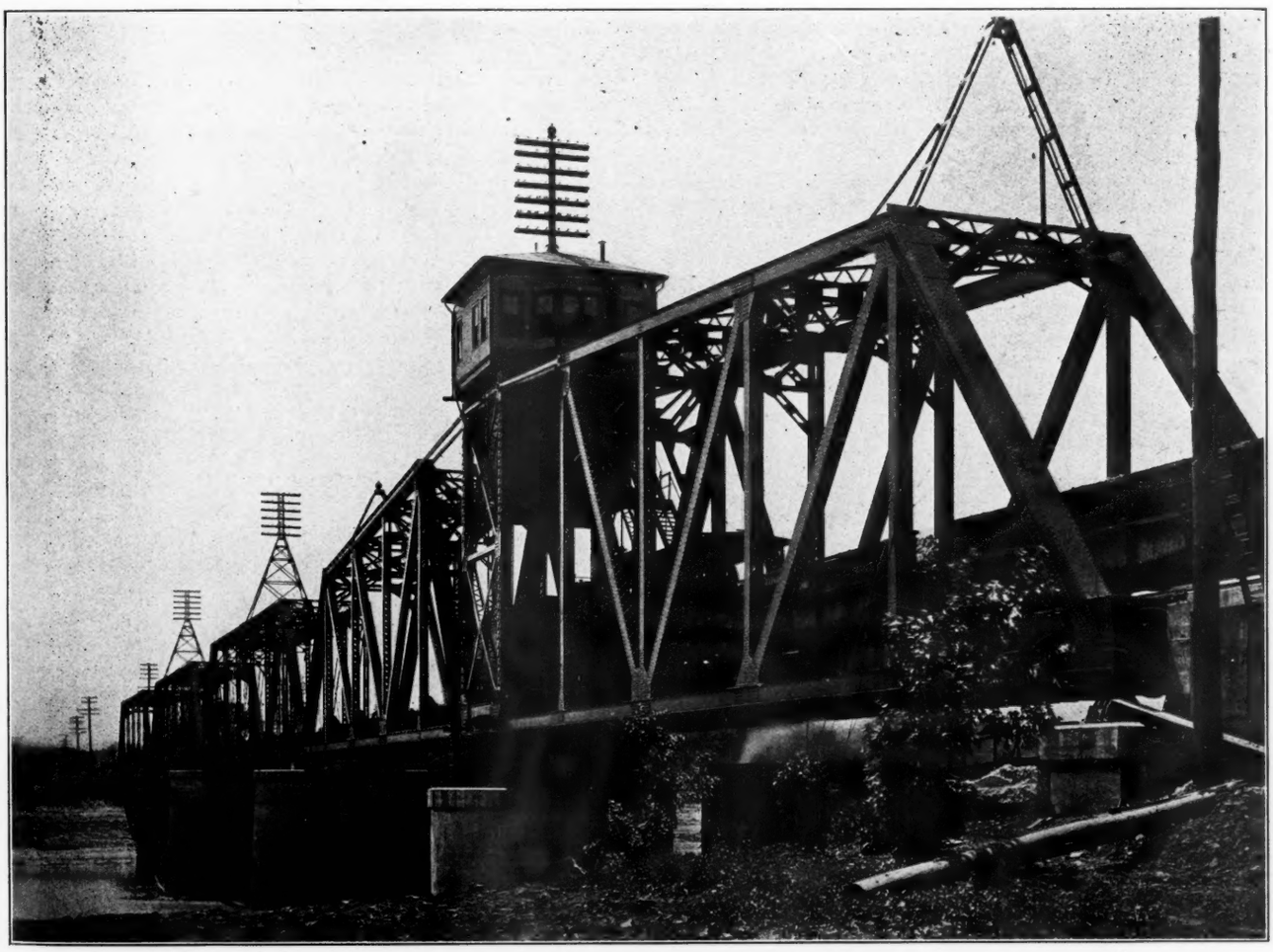
The last few years have seen a marked increase in the weight of locomotives operated by the Illinois Central. In order to run these heavy locomotives between Paducah and Central City on the Kentucky division it was decided in June, 1909, to renew a portion of the bridge over the Cumberland river at Cumberland River, Ky., and this work has just been completed. This bridge consisted of 281 ft. 11 in. draw span, a 178 ft. fixed span, built in 1890, two fixed spans 177 ft. 6 in. long, built in 1903, and a timber trestle approach 397 ft. long.

The two 177 ft. 6 in. spans are comparatively new and, having been designed for approximately Coopers E 50 loading, did not need renewing. The draw span, however, was designed for a much lighter loading, and was reinforced in 1898, while the 178 ft. fixed span was designed for a still lighter loading. In connection with the renewal of these spans it was also decided to fill most of the timber trestle approach and to provide an overflow channel by building 100 ft. of concrete trestle.

As the War Department would issue a permit for the driving of falsework for the rebuilding of only one of the steel spans at a time, it was decided to renew the fixed span first. Because of the condition of this span, it was put on falsework at once, thus relieving the old span while a new one was being designed and fabricated. This falsework was protected by a floating shear boom consisting of two lines of 12 in. x 12 in. timbers separated by a space two feet wide. The timbers in each line were framed one on top of another so as to be three feet deep, with struts framed across to hold the two lines together, each timber being firmly drifted to another. The boom floated with from three inches to six inches projecting above the water level. This boom was constructed during July, 1909.

On January 11, 1910, this falsework and shear boom were destroyed by ice, the piles being practically sawed in two by the grinding action of the ice, which left standing but three bents, two at the north end and one at the south end of the span. The river was then in too dangerous a condition to allow anything to be done toward replacing the falsework until about March 7, when work was started on new bents and a shear boom was constructed which was reinforced with piles, driven as shown in the accompanying drawing.

Meanwhile the new steel had been delivered, but on account of the river conditions, the erection was deferred for a more favorable season. No further trouble was experienced with the falsework, until during the erection of the steel, when a pile cluster at the apex of a short floating boom gave way, allowing



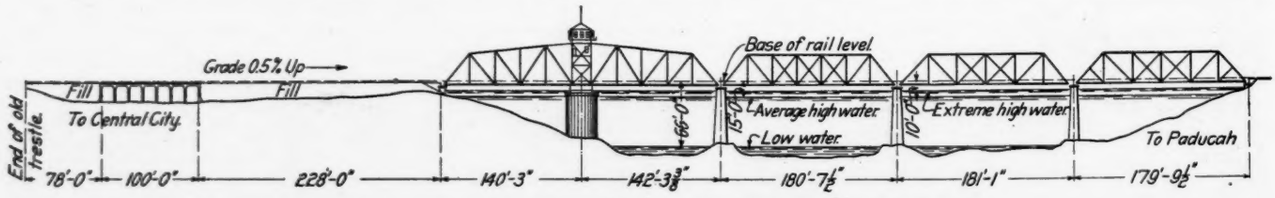
The Completed Bridge Across the Cumberland River.

the boom to swing down stream as far as the cables fastened to it would permit, thus forming a concave barrier to the drift. As shown in the drawing a vast quantity of drift accumulated against this circular boom, the first drift sinking as more was added until a great wall was formed, which caused considerable anxiety lest the cables should give way before the erection was finished. However, no trouble was experienced from this source.

The work of taking down the old span and the erection of the new steel was started April 20, 1910, and was completed May 11, 1910. This work was done by company forces with a derrick car.

Early in January, 1910, the design for the new draw span was started. The design was completed and the order for the steel was placed about March 15. The draw span is 282 ft. long, center to center of end pins, and is of the riveted type throughout, except for the eye bars in the top chord of the tower panel and the panel on each side of the tower. A rim bearing center was used in order to bring the load on the outer edge of the old masonry, as this consisted of good dimension sandstone. What the core consisted of could not be determined, as no detail drawings could be found which showed the formation of the old masonry. It was therefore thought best not to take any chances with the center bearing type. This proved to be a good precaution, for after the old coping was removed preparatory to placing the new one, 15 cu. yds. of grout were poured into the core of the pier, and even then it is probable that the cement set before all the cracks were filled up.

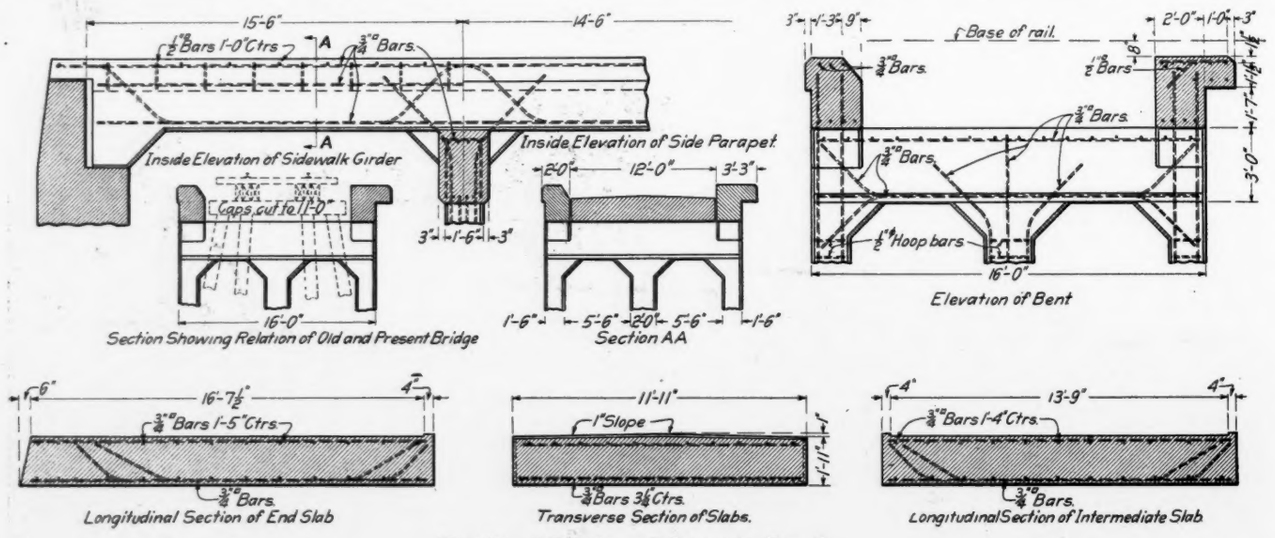
The work on the masonry consisted of placing a concrete jacket around piers 2, 3 and 4 and abutment 1. These were originally built of sandstone, while pier 5 and abutment 6 were built of limestone. Rumor states that the original plan contemplated building all the piers of limestone, the stone to come from a quarry a couple of miles below the bridge, but the agreement with the Government required that the bridge be completed within a given time, and this limestone was so hard to work that in order to finish on time it was necessary, after building two of the supports to build the others of sandstone from a quarry on the Tennessee river. The details of the concrete jacket for the pivot pier (Pier 2) are clearly shown in the accompanying drawing. It was decided to place the jackets because, even with the old draw span the pivot pier trembled considerably during the passage of the live load, while pier 3 had been moving up stream for a number of years past, making it very difficult to maintain the alinement of the bridge. The old masonry was built on a timber griliage, and was heavily protected with riprap, which made it very difficult to drive sheeting. For this purpose U. S. steel sheet piling was used around piers 3 and 4, the intention being to complete these two piers, pull the piling and redrive it around pier 2. However, the work was interrupted on these piers four times by the river rising and flooding the cofferdam, causing a total delay of 22 weeks, so that in order to complete the work without undue delay 9 in. Wakefield sheet piling was used around the pivot pier.



Elevation of New Cumberland River Bridge of the Illinois Central.

As mentioned above, pier 3 has been moving upstream for a number of years. In order to maintain the alinement of the old bridge, the spans resting on this pier had been lined over a little each year for four or five years, so that the shoes on the downstream end of the pier were very close to the edge. After the steel cofferdam had been driven around this pier, it was necessary to remove the riprap in order to drive the foundation piles for the concrete jacket. This materially affected the stability of the pier, and the driving of the foundation piles caused so much movement that it was necessary to drive the piling alternately, one on one side and then one on the other, which of course made the work slow and expensive.

A marine driver which could back away from the pier was used to drive the foundation piles for pier 3 and also for the river side of pier 2, but it was necessary to use a land driver and a steam hammer swinging on the end of a boom for the shore side of pier 2. In order to be able to swing the boom from one side of the pier to the other, the boom had to be unstepped, shortened about eight ft., restepped and swung over, then unstepped again, lengthened and restepped. When one stops to consider that this operation had to be gone through between the driving of each pile for at least one-half the foundation piles



Details of Reinforced Concrete Trestle.

for pier 2, an idea of the expensive character of the work can be obtained. Even with these precautions, pier 2 settled considerably. This settlement was very marked at three different times, the maximum for any one time being one and one-quarter inches. A total horizontal movement of nine and one-quarter inches took place toward the river during the rebuilding of this pier, and at one time it was thought that this movement would be so great that it would interfere with the operation of the old draw span. This was almost the case, for the last time the old span was swung, it was necessary to chip off the rivets of the end cover plate of the bottom chord in order to clear the fixed span.

At some previous date, hoops of ¾ in. x 3 in. flat iron had been placed around the pier at vertical intervals of about 2 ft. in order to keep the pier from bursting. One evening two of these straps near the bottom broke. This of course had to happen on Christmas Eve, when most of the men had left to spend the following day at home. To repair this damage and to prevent the loss of the entire pier and draw span, one and one-quarter in. round rods with turn buckles were rushed out from the shops at Paducah, and a set of six of these rods with turnbuckles 60 deg. apart were placed every 12 in. for a height of about 30 ft.

Falsework for the taking down of the old draw span and the erecting of the new was driven up and down stream. This falsework was driven by a marine driver, framed and put together at the bridge site. The center casting, drum and loading beams were erected with a derrick car and the main trusses and floor system were erected with a traveler. While the old span was being taken down and the new one erected, traffic was carried on falsework driven across the river. Part of this falsework was driven by a track driver, but the portion requiring long piles was driven by the marine driver. At the time this falsework was designed it was decided to provide a 60 ft. channel for the river traffic by making a deck span out of the girders of a through span, as these were the only ones available. This deck span was to be raised by a gallows frame. However, during the actual work a light lattice deck span was used which was raised off its seat and run into the adjacent fixed span by the derrick car, as shown in the photograph. The erection of the draw span was started September 4, 1911, and completed February 10, 1912.

Reinforced Concrete Trestle with Continuous Parapet Walls.

Erecting the Swing Span on Falsework.

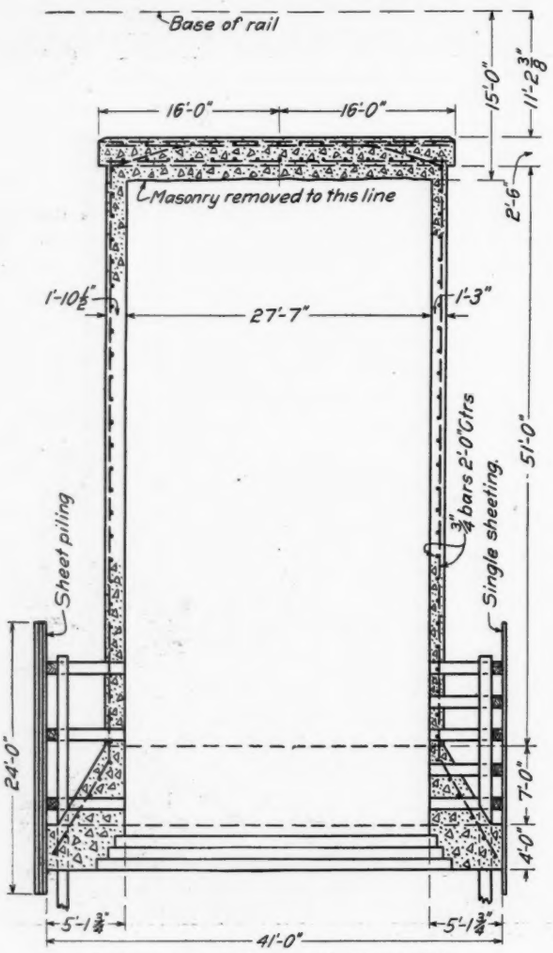
To open the old span, take out the four sets of center diagonal members and the two batter posts, and to place the necessary pony bents and the falsework over the center pier, to put on the deck and lay rails for train operation took five hours and 45 minutes, while three hours and ten minutes were required to tear out the deck and pony bents and swing the new draw span into position.

During the time that work was shut down on the piers on

account of high water, the masonry gang was employed on the construction of the concrete trestle for the overflow channel, the general side elevation and cross section of which are shown in the drawing. The interesting features of its design are its height and the continuous chords tying the several bents together. No expansion joints are allowed in these chords except at the abutments.

The abutments, bents and chords were all built without interfering with the old timber trestle except to cut six inches off each end of the caps. A single slab, 11 ft. 11 in. wide, 2 ft. thick and 14 ft. 5 in. long, weighing approximately 26 tons, rests on the concrete bents between the chords and carries the entire live load of one panel. These slabs were built in a curing yard some distance beyond the end of the trestle, and after curing for four months were placed by a derrick car.

The draw span is equipped with both hand and power operating machinery. The hand machinery was designed first and was furnished complete by the bridge company. A separate contract was let for all of the power machinery except the main track pinion and shaft, and two sets of reduction shafts and gears between the main vertical shaft from the power house to the



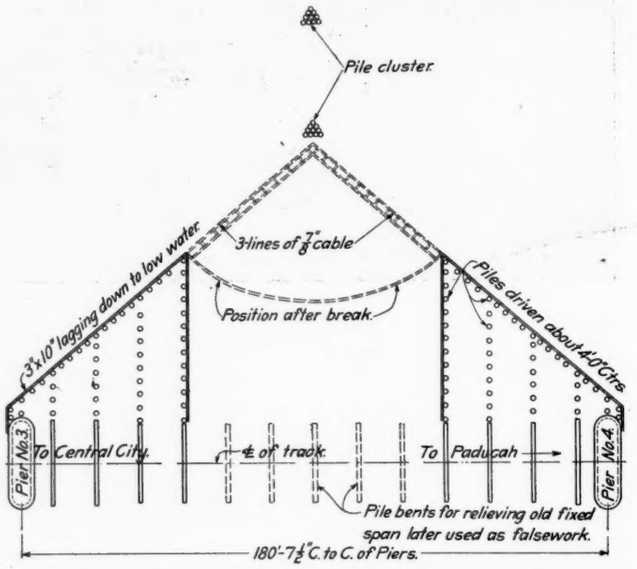
Concrete Jacket on Old Pivot Pier.

rack pinion shaft which were furnished by the bridge company.

Preliminary designs and estimates were worked up for three different types of power machinery. A gasoline engine and line shafting for operating the rail-locks and wedges and for turning the draw; compressed air for operating the rail-locks and wedges and a gasoline engine for turning the draw and running the air compressor; and separate electric motors for operating wedges and draw, obtaining current from a generating and storage plant. The second design was adopted.

Compressed air is used for driving the rail locks and end lift wedges. A two-cylinder, vertical gasoline engine operates to turn the bridge and to run the air compressor. All the movements of the different operating parts are mechanically interlocked in the operator's stand, which is also locked with an electrically operated interlocking plant protecting the draw bridge.

The rail lock consists of a key 5 ft. 6 in. long which slides between the outside of the rail and a guide casting. This key is made of cast steel with a cast manganese wearing surface for carrying the rolling stock. The end lift is of the wedge type with a slope of 1½ in. in 1 ft., and is designed so as to center and raise the ends to line and grade, thus doing away with the


Pile cluster
3 lines of ⅞" cable
3"x10" lagging down to low water
Position after break
Piles driven about 4'-0" Ctrs
Pier No. 3
To Central City
℄ of track
To Paducah
Pier No. 4
Pile bents for relieving old fixed span later used as falsework.
180'-7½" C. to C. of Piers.

Shear Boom Protection for Falsework Under Fixed Span.

necessity of a bridge centering lock. The machinery for each movement is equipped with two sets of jaw clutches, the one set to be pulled and the other set to be driven in case any emergency should require the use of hand machinery.

As stated above, a separate contract was made for furnishing and installing the power machinery, but all field work on the substructure and superstructure, including the installation of the hand machinery, was done by company forces acting under directions from F. L. Thompson, engineer of bridges and buildings, and A. S. Baldwin, chief engineer.

PROPOSED RAILWAY FOR PARAGUAY.—The Paraguay Northeastern Railway, for which a concession was granted in 1911, will run from Asuncion northeast to the Brazilian frontier, where it will cross the Parana river, and then to a point on the Transcontinental Brazilian line, which crosses the states of Parana and Sao Paulo. The concessionaire syndicate represents a capital of $9,733,000.

WIND PRESSURE ON BUILDINGS.—The stresses to be used in designing the members of mill buildings are materially affected by considering the suction effect on the leeward side of the building due to the wind. Such stresses may not only be different in amount from those computed on the present basis, but in some cases they may differ as to sign, according to the conclusions reached by Albert Smith, professor of structural engineering, Purdue University, in a paper presented to the Western Society of Engineers, October 7, 1912, based on tests made at Purdue on a full size building under actual wind conditions. He also finds that an opening as great as two or three per cent. of the outside surface may seriously reduce or increase the suction, depending on which side the openings are on. It is expected to secure additional information on this subject in a further series of tests.

RAILROAD CLEARING HOUSE PLAN.

At the annual meeting of the Society of Railway Financial Officers, held at Atlantic City, October 23-25, the executive committee submitted to the association a plan of organization of a railway clearing house to settle balances between railway companies as submitted to the executive committee by the committee on clearing house settlements. The society decided to refer the report back to the executive committee with authority to establish a clearing house either in accordance with the plan submitted, or on a modified plan, to be decided upon by the executive committee after further consideration. A meeting of the executive committee will be held shortly to consider the plan of organization or any modifications, with an endeavor to bring about the formation of a clearing house at an early date. The plan of organization is as follows:

I. The name of this association shall be "The Railway Clearing House."

II. Any railway, transportation or equipment company may become a member of the association upon signing the articles of association, paying in its assessment for a working fund based on its gross earnings for the previous calendar year, and giving a bond in such sum as may be decided upon, the amount to be based on its gross earnings for the previous calendar year, to secure the other members against any loss by its failure to pay balance drafts against it, etc.

III. The management of the clearing house shall be in the hands of a board of thirteen directors, six of whom shall be financial officers of different systems, and six of whom shall be accounting officers of different systems, who shall be appointed by the executive committee of the Society of Railway Financial Officers, and the thirteenth member shall be the president, for the time being, of the Society of Railway Financial Officers. This board, immediately upon organization, shall by lot divide itself into three classes of four directors each, two of whom shall be financial and two accounting officers. The term of the first class shall expire with the end of the first year, the term of the second class shall expire with the end of the second year, and the term of the third class shall expire with the end of the third year. As the term of each class expires their successors shall be appointed, two by the executive committee of the Society of Railway Financial Officers, and two by a committee of the Association of American Railway Accounting Officers, the appointees in each case to be officers of lines which are members of the clearing house, who shall serve for three years, or until their successors are appointed.

IV. A vacancy on the board from any cause shall be filled by the remaining directors, who shall by ballot elect someone, from a line, member of the clearing house, to fill the unexpired term of the deceased or retiring director, the successor to represent the same department—financial or accounting—as the director whose place he takes.

V. The officers of the clearing house shall be:

A chairman, who shall be the then president of the Society of Railway Financial Officers and a vice-chairman, who shall be chosen by ballot by the directors from their own number at the beginning of each year, both of whom shall serve without salary.

A secretary, who shall be paid for his services, but who need not necessarily give his whole time to the association.

A manager and an assistant manager, who shall be paid salaries and give their entire time to the clearing house, the salaries of all officers to be fixed by the board of directors.

There shall be such clerical help as the directors may approve.

The manager, assistant manager and other employees shall be bonded in such sums and with such sureties as the directors may approve; the premium to be paid by the clearing house.

All necessary expenses, traveling or otherwise, of its officers and employees shall be borne by the clearing house.

VI. The clearing house shall be located in Chicago, or in such other central place as may be approved by the directors.

VII. The clearing house may keep its funds in and make its collections through banks in New York, Philadelphia, Chicago, St. Louis and such other cities as may be found advisable for the economical collection and payment of balances due to and by the clearing house, the depositories to be approved by the directors.

VIII. The clearing house will settle balances only and will not undertake to make adjustments between members, its purpose being merely to facilitate and simplify the financial part of the settlement.

IX. The general plan for operation shall be as follows, to be modified from time to time as experience may prove advisable:

(a) Each member shall adjust with each other member during the succeeding month its balances for per diem, freight, ticket, freight claims and such other indebtedness as may be shown on the books and which are now usually settled by draft and at the end of that month forward to the manager of the clearing house a statement of such balances, to be in his hands by a fixed date of the following month.

(b) On a certain day, as soon thereafter as possible, the manager shall advise each member of the correctness of the net balance reported as due to or from that member; as soon as possible thereafter he shall deposit drafts upon all members whose settlement balances are debtor and as soon as practicable thereafter mail checks to all members whose balances are credits.

X. Car repairs or any other kind of claims may be settled through the clearing house if reported by mutual agreement, in the consolidated balance between the companies interested.

XI. The expenses of the clearing house, less any amounts received as interest on bank balances, or from any other source, shall be charged monthly to the members in the proportion the total of their debit and credit balances bears to the entire debit and credit balances cleared for the month, and bills shall be rendered by the clearing house each month to each member and included in the clearing house settlement for the next month, or separate drafts made therefor, if desired.

XII. The board of directors shall provide for a careful audit of the accounts of the clearing house to be made at least once each year, either by a firm of public accountants or by a committee of their own members, who shall have such clerical assistance as may be necessary.

XIII. Any member desiring to withdraw from the clearing house shall give three months' notice in writing of its election so to do, and when it shall have fully paid all balances and charges against it in the clearing house, the amount of its deposit for the working fund shall be refunded and its bond released and returned to it.

XIV. Any member failing to pay a sight draft for proper balance due the clearing house, or for its proportion of expenses, shall be suspended from membership and the amount due shall be charged against its interest in the working fund, and if not liquidated, proceedings shall be instituted to recover on the bond the amount still remaining due, and the delinquent member shall be dropped from membership.

XV. The directors of the clearing house shall have power to make, establish, alter and annul regulations for carrying on the business of the clearing house, when not in conflict with the articles of association forming the charter or constitution of the clearing house.

XVI. The articles of association, as the constitution of the clearing house, may be amended by a two-thirds vote of the members of the clearing house at any two consecutive regular or special meetings, not less than one month apart, provided one month's notice shall have been given in writing before each such meeting, stating that an amendment is to be considered and giving its general purpose.

The election of officers of the society took place at the meeting: T. H. B. McKnight, treasurer of the Penn. L. W., was made president, succeeding H. C. Ansley, treasurer of the So. Ry.; George H. Crosby, vice-president of the C. R. I. & P., was made first vice-president, succeeding Odell S. Smith, of the N. & W. Steamboat Co.; C. P. Nash, local treasurer of the C. St. P. M. & O., was made second vice-president, succeeding Joseph B. Lacy, treasurer of the N. & W., and Carl Nyquist, assistant secretary of C. R. I. & P., at Chicago, was re-elected secretary and treasurer.

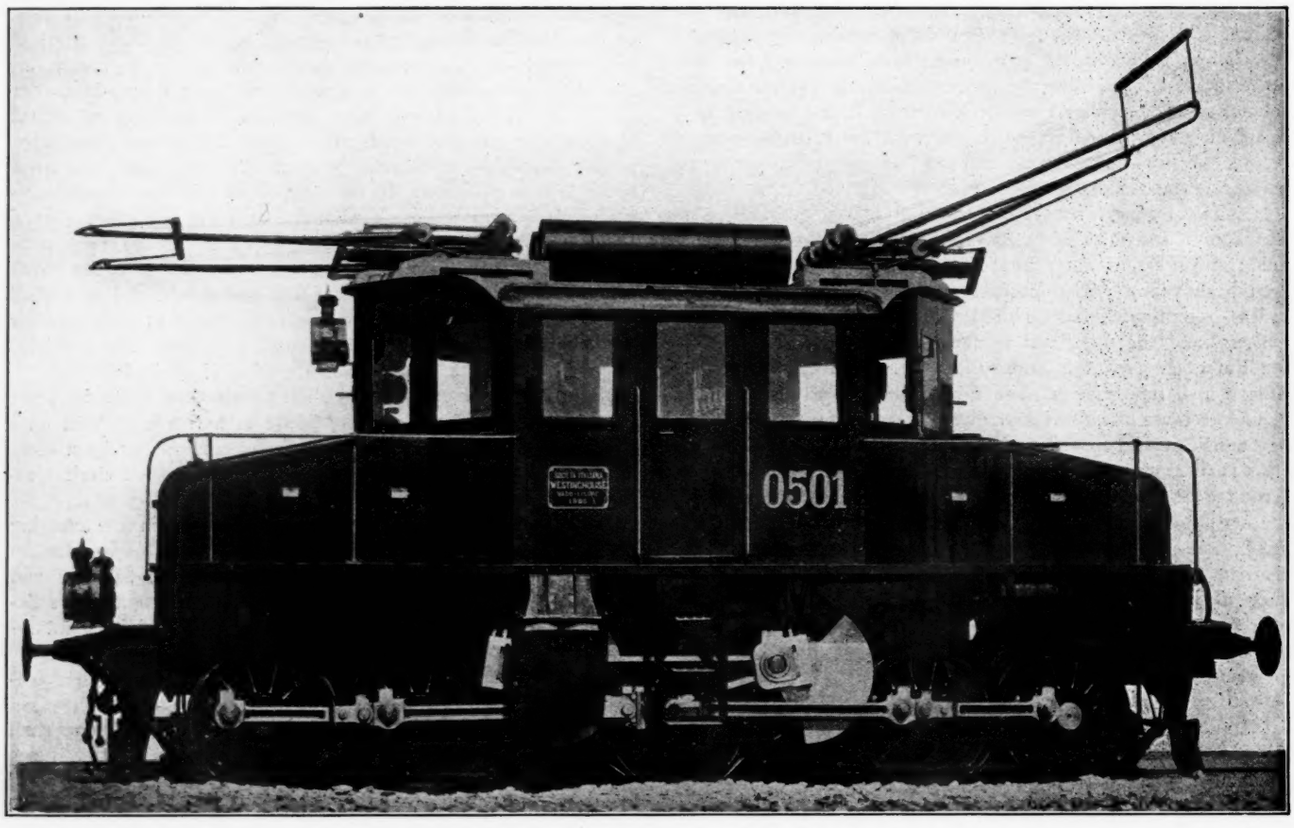
RAILWAY TRUNK LINE ELECTRIFICATION.*

Important Problems Considered, Together with a Resume and Brief Description of Types of Electric Locomotives.

By N. W. Storer,
General Engineer, Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.

It has been said that the delivery of transportation is the business of all railways. The source of the power required for this work is one of the, if not the most, important elements that combine to produce this output. For many years the steam locomotive had absolutely no rival. It had a complete monopoly of the business and like some other monopolies it lacked the incentive of competition. Since the electric locomotive entered the field, however, there appears to have been a great awakening among steam locomotive designers which has undoubtedly delayed all electrification of railways and possibly has prevented for many years at least the electrification of most of them. The improvements in the steam locomotive, such as mechanical stokers, superheaters, smoke consumers, etc., have led to the production of the enormous units that are now standard. These great machines have produced such excellent results that the electric locomotive has no longer such comparative advantages as were apparent even ten years ago, and while I believe that the electrification of a large part of our railways is certain to be accomplished at some time I also believe that the improvement in steam locomotives has removed the crying necessity for it, except in special instances.

The railways should not be pushed into terminal electrification by legislation before they are ready to handle the problem to the best advantage, for a large amount of money would have to be spent unnecessarily. The subject should be studied with the greatest care, the best system determined, and electrification adopted where there will be a distinct economic advantage. To undertake the electrification of railways in Chicago, for instance, means the expenditure of millions of dollars, and unless money is simply to be thrown away, it must involve the most careful study of everything that is concerned with the problem. There are many things which are charged to electrification in making estimates of its cost, such as improvements to better the service, which have nothing to do with electrification, except that they may be added if the railways are to electrify, and not because of electrification.



Electric Side Rod Locomotive with Scotch Yokes.

In the electrification of railways, in large cities especially, it is of the utmost importance that they should unite, and give every plan the most careful consideration before doing anything more than is absolutely necessary. That does not apply simply to the system of electrification, but to everything which is required at the terminals, the laying out of the tracks, the structures that will be involved, and new terminals and stations all along the line. While this may delay matters for a while, it will be to the ultimate advantage not only of the railways, but of the public and the manufacturing companies as well. It certainly would be a serious mistake if the newspapers and the public opinion in a city like Chicago should drive the railways to electrification before they were ready. Chicago will be ahead in the end if it will have patience to wait until the railways can get together and find out what they really ought to have and get some uniformity in it.

* Abstract of a paper presented at the convention of the Association of Railway Electrical Engineers, Chicago, October 24, 1912.

PROBLEM OF ELECTRIC LOCOMOTIVE DESIGN.

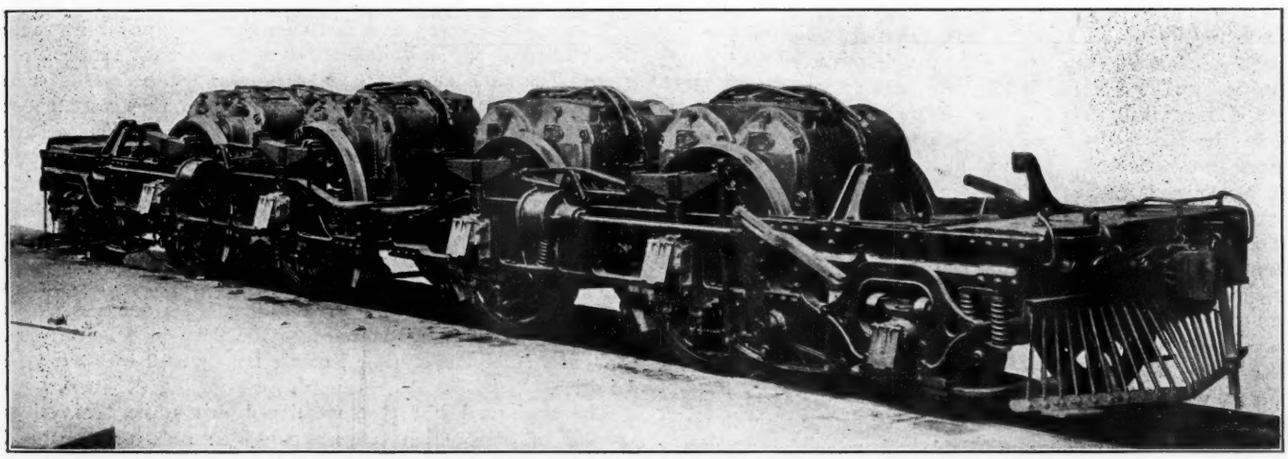
The manufacturing companies have done a tremendous amount of work in developing the various systems of electrification and the design of electric locomotives. It has been found especially that the low center of gravity on the electric locomotive of the type which was early proposed, instead of being an advantage, was a decided disadvantage, and it has been recognized for many years that one of the greatest problems, if not the greatest, in the electric locomotive is the transmission of the torque of the motor to the driving wheels. There have been a great many combinations proposed, and quite a large number of different types have been built and are now in operation, but there are very few transmission systems that are absolutely satisfactory from all points of view. In this respect, as in most others, every design is a compromise of the conflicting elements not simply in the locomotive itself, but on the roadbed and in the shop as well.

The necessity for a careful study by the manufacturers of the entire problem of railroading, if the best type of locomotive is to be produced, is fully recognized by them. The designers of electric locomotives and the people who are to furnish the apparatus for electrifying railroads must come into closest touch with the operating officers of the roads, who should give them the benefit of their experience. No suggestion can be made that is too small to receive consideration. In the last analysis all must agree that the best locomotive is the one that will deliver the transportation required of it with the lowest sum total of expense. This, of course, not only includes the first cost, and the cost of maintenance and depreciation of the locomotive itself, but the first cost and cost of maintenance, depreciation and operation of the entire installation, as well as the cost of power at the locomotive and the cost of upkeep of the roadbed. It is because there is so little definite and reliable information on all these various subjects that there are so many different opinions concerning the systems of electrification and the proper design of locomotives.

The standard type of single reduction geared street car motor has been eminently satisfactory for street car service, but the difficulties connected with it have increased enormously as speeds and the power of motors have increased, until today it is generally believed to be poor practice to gear locomotives directly to the axle except for slow speed work. Several reasons have contributed to this belief: First, the spur gears are subjected to severe punishment when run at high speeds when rigidly connecting so much inertia in the wheels and the armatures, and to still greater punishment from shocks due to the roadbed. It has also been found that the pinions on the motor pushing downward on the gears are subject to much more severe treatment than when the motor pinion is pushing upward. Second; the dead weight of the motor is on the axle and its low center of gravity will cause serious injury to the track when operating at high speeds. There will also be a heavy side thrust of the wheel flange against the rail on curves and where the locomotive has a tendency to nose. Although steam locomotives have this same nosing tendency they do not injure the track because the mass or center of gravity is so high above it. This same feature should be sought for in the electric locomotive. Chiefly for these reasons the speed of most locomotives having heavy motors geared directly to the axles is limited to about 30 m. p. h. This type of locomotive, however, is comparatively simple and it is cheap and easy to maintain.

TRANSMISSION OF POWER IN ELECTRIC LOCOMOTIVES.

The big question is how to connect the motors with the driving wheels so as to provide a high speed locomotive that will have a reasonable cost of maintenance, and at the same time be a good riding machine; that is, one that will do the least possible damage to the track. There are several general types of such locomotives: First, those with motor armatures mounted rigidly on the driving axle, known as the New York Central type. Second, those with motors mounted on a quill surrounding the axle, which is the type of the original New York, New Haven & Hartford passenger locomotives. Third, the motor geared to a quill surrounding the axles, and connected to the wheels through long helical springs, which is the latest type of locomotive of the New Haven and some others. Fourth, motors mounted in the cab and driving through a jack shaft and a system of parallel rods such as are in use on the Pennsylvania Railroad. Fifth, motors mounted low between frames and connected to the drivers through a Scotch yoke. The Italian three-phase locomotive is of this type. Sixth, motors connected to the wheels by some combination of gears and side rods. That is the type used in the Loetschberg tunnel, Switzerland, and on the Midi Railway in France.



Running Gear of New Haven Electric Locomotive with Four Motors for Each Axle.

The first type has the disadvantage of a low center of gravity, but is a machine that is ideal in its simplicity in many respects. It has not been very successful for high speed work on account of its nosing tendency, which requires that the adjustments be kept in perfect order to reduce it to a minimum. The center of gravity of this type is about 44 in. above the rail.

The second type mentioned, that having the motor mounted on a quill surrounding the axles and connected to it through springs, is open to some of the same objections as the first type. This also has low center of gravity, although it is considerably higher than the first type, but all the weight is spring supported so that the track does not get the direct blow. The original New Haven locomotive nosed quite badly at high speeds, but by the addition of an idle axle at each end of the locomotive and

a toothed cam-centering device between the cab and the trucks, this was entirely cured. The cam is arranged so that when the truck moves sidewise it must lift the cab, which tends to throw it back to the central position. The locomotives now have no tendency to nose even at speeds up to 75 and 80 m. p. h., where formerly they nosed badly at 50 and 60 m. p. h. However, even with the motors carried by springs, the track is liable to more or less damage unless it is kept in good condition. Every electric locomotive which goes to the New Haven must have no dead weight on the axles, as it is believed that any dead weight on the axle aside from the wheels and axles themselves is unnecessary and extremely detrimental to the track. Therefore, the motors are mounted on the quill with springs as described.

In the third type the motors are mounted above the axle and drive gears mounted on the quills. This type is used on the latest New Haven electric locomotive,* which has the same wheel arrangement as the original New Haven type. This locomotive has a high center of gravity and the quills are so spaced that they have a total play of 3 in. about the axle, 1½ in. above and below, which allows for imperfections in the track. These engines ride very smoothly. They have been in service on the New Haven and in the Hoosac tunnel on the Boston & Maine, and forty more are now under construction for the New Haven. This type has been built both with a single motor per axle and with twin motors of the same total capacity per axle. After building a number of the former, whose motors were so large as to require double gears, it was found that the same output could be obtained with less weight and less cost by substituting two motors for the one large one. This arrangement is illustrated herewith, and has the following advantages: First, only one gear is required, as both motors drive through the same gear. Second, the two motors are lighter and easier to handle and cheaper to maintain than the large one. There is no more chance for damage in the small motors than there is in the big ones, as they have practically the same number of coils in the motor and the same number of connections and commutator bars and brushes and brush holders as the big motors; and the small motors are much easier to repair and handle. Third, the motors in this case are interchangeable, with the exception of the field castings, with the motors which are used on the New Haven multiple unit motor cars. Fourth, two motors being connected permanently in series gives in effect one motor of double voltage, and consequently half current. This reduces the carrying requirements of cables and switches to one-half, and thus makes a substantial saving in the cost of control equipment. While these locomotives are now built for single phase operation, they would have practically the same advantages on direct current. The twin motor scheme adapts itself well to high voltage d. c. operation.

The fourth type of locomotive, that with the motors mounted high up in the cab and connected to drive wheels through cranks, parallel rods and jack shaft, is the type adopted by the Pennsylvania Railroad† for the New York terminal. They have a very high center of gravity and although the weight on the driving axle is about 56,000 lbs., and consequently requires stiff springs, the locomotive has riding qualities corresponding to the best steam locomotive. There is no tendency to nosing and no bad effects on the track. These locomotives are the most powerful electric locomotives ever built, and have shown themselves to be reliable, having a record for the first year, with 33 locomotives in service, of but 13 train minutes delay chargeable to the locomotives. They have a guaranteed tractive effort of 60,000 lbs. and have actually developed over 75,000 lbs. at the drawbar. This corresponds to a crank pin pressure of over 100,000 lbs. Of course, the normal pressure on crank pins is not nearly so high, but it is sufficient to impose strains on the jack shaft bearings that are very hard to hold. The locomotives will haul a train weighing as much as eight hundred tons up a 2 per cent. grade. The main rods are set at an angle of 45 deg., which is much to be preferred to the vertical motor rods adopted for the first locomotive built for the German State Railways. These were practically failures and it is understood that future locomotives will have motor rods arranged similarly to those of the Pennsylvania. It has been found that locomotives of this type require very careful adjustment to maintain the shafts parallel and properly centered and quartered.

The use of side rods on an electric locomotive introduces some different problems from those found in the steam locomotive. As there are no reciprocating parts such as piston rods, the parts are susceptible to perfect balance which is usually impossible in the steam locomotive. The rods must be very much larger than for a corresponding steam locomotive because the entire power has to be transmitted through one set of pins and rods at certain points in the revolution while the steam engine transmits the power from only one cylinder. The steam engine has another advantage in that the main rods on the two sides are connected to loose ends, while the rods on the two sides of the electric are connected to opposite ends of the motor shaft as well as the jack shaft, which introduces a great many chances for inaccurate workmanship in quartering and tramming and consequent knocking in the pins and bearings.

The fifth type of locomotive, that employing the Scotch yoke for transmitting the power from the motors to the driving axles, has been used exclusively for the three phase locomotives on the Italian state railways. The first ones have been in service some 10 or 12 years on the Valtellini line and have given excellent results. The later ones, some 35 in number, which are shown in one of the accompanying photographs, have been used about two years on the Giovi line near Genoa. These machines have some excellent qualities, light weight, powerful motors, and motor weight entirely spring supported. They have, however, been used only in slow and moderate speed service, so their performance at high speeds remains to be shown. These locomotives also require very accurate adjustment although not so close as the one with side rods and jack shafts, as the Scotch yoke drives one axle through a sliding block and the others through parallel rods connected to the yoke by knuckle pins. Spherical crank and knuckle pins are largely used with this type of drive.

The sixth and last type mentioned drives the locomotives through a combination of gears and side rods, or gears and Scotch yokes. A number of such locomotives have been built, the most notable being the one for the Loetschberg Tunnel in Switzerland and the one for the Midi Railway in France. The former has two 1,000 h. p. motors each connected by a helical tooth gear to a jack shaft, which is slightly above the driving axles, and thence by parallel rods to three pairs of driving wheels. Although the motor speed is extremely high, the gears operate practically noiselessly and with high efficiency. The duty on the jack shaft bearings is much easier than when side rods only are used, since the reciprocating pressures are practically all in a horizontal direction, and can therefore be cared for much more easily. Either of these types has a fairly high center of gravity. While either locomotive is subject to criticism for having both gears and side rods, it must be admitted that the arrangements for both are such as to give the best results. The jack shafts for side rod drive should be located in the same horizontal plane as the driving axles, consequently the problems connected with tramming and quartering, and with bearings would be reduced to a minimum. In some respects, this design is superior to either straight geared (gears on axles) or straight side rod types, and it is probable that a great many locomotives with gears and side rods will be built. The twin motors may be used here, thus reducing the gears to the lowest number or the smallest width of face.

CHOICE OF SYSTEM.

If the choice of system rested only on the locomotives, undoubtedly the standard 600 volt d. c. system would be chosen in the large majority of cases as being the simplest and best adapted

* See *Railway Age Gazette*, June 28, 1912, page 1608.

† See *Railway Age Gazette*, March 3, 1911, page 439, and November 5, 1909, page 881.

for the work, but for the electrification of a trunk line this is an economic impossibility, because the low voltage requires too great an expenditure for substations, which must not only be large but numerous. The efficiency is too low except where the traffic gives a good load factor. It is only possible with a third rail system on account of the enormous currents required. It is therefore generally accepted as a fact that the current must be taken from an overhead trolley. It then becomes a question as to how much current can be collected from an overhead wire, and this is really the most important problem of any. It is probably safe to say that a current of 200 to 300 amperes may be continuously collected at high speeds, either by wheel or some form of roller or sliding shoe. The wheel can scarcely be considered for high speed locomotive work for obvious reasons, but both roller and sliding pantagraph trolleys have been used.

It is of the greatest importance in high speed service to have the overhead construction very flexible and to have the current collectors light. Otherwise there will be a great deal of flashing and the wire will receive a kink at every suspension point that will soon cause it to break. Further, the number of collectors in a single span should be limited so as to prevent the entire span from being lifted. All these things tend to limit the amount of current that can be collected for a single train, and consequently to raise the voltage. About the lowest direct current voltage that should be considered for high speed trunk line service is 3,500 volts, on account of the difficulties of current collection. Whether locomotives can be made commercially with this high voltage remains to be determined. Even if locomotives having it were to be built, however, it is very certain that such a voltage is entirely beyond the range of multiple unit car operation so that any line with 3,500 volts d. c. on it would be confined to locomotive service.

The single phase system is the only one that has successfully solved the problem of current collection at high speed. The usual voltage for heavy railway work in this country is 11,000. In Europe it is even higher—15,000 for the Loetschberg tunnel line, and this will probably also be used in Germany in the electrification of the state railways. Either voltage makes it a comparatively simple matter to collect the current necessary for the heavy trains. This system has an advantage over the high voltage d. c. system in having the high voltage confined to circuit breaker and transformers while the d. c. voltage is applied to all apparatus. It is impossible to tell what will be the limit of direct current work, but with the great extensions the New Haven is making we ought soon to know what the single phase system can do on a trunk line.

THE "MULTI-CAR" SYSTEM.

W. H. McCune, of Monrovia, Cal., has secured a patent on his "Multi-car System of Handling Freight," which he informs us is under consideration by a number of railroad companies, with a view to putting it in use at one or more important shipping points, if it shall be found economical to do so. Taking a long freight house, Mr. McCune proposes to run through it a depressed track, about 12 ft. back from the receiving doors, and on this track he will run two platform cars ("transports") which, by a suitable loop at each end of the house, can be run around to a track parallel to freight cars standing opposite the house; and these platform cars, propelled by electric motors, will be used to carry "cargo loaders," about 4 ft. x 6 ft. in size, which are to be loaded with freight at the receiving doors and then carried around the loop, 10 of them on a car, for deposit in the proper freight cars. The track being at the right height, the "loaders" will be run on to the transports and from these into the cars very quickly and easily. One receiving clerk and one helper will load the goods at the receiving door, and one stowman takes the goods off the "cargo loaders" and piles them in the car.

Mr. McCune does not furnish any detailed estimates of the cost of installing a plant of this kind, but he claims that, besides getting rid of the two-wheel truck and reducing by 50 per cent. the number of men required in a freight house, there will be a marked advantage in having a better check at the receiving doors, in securing the exact weight of each piece and lot of freight, and in accomplishing a greatly improved freedom from errors in loading.

DENSITY OF LOCOMOTIVE SMOKE IN CHICAGO.

The average locomotive in the city of Chicago at the present time is making smoke the density of which is 14.92 per cent., according to records compiled by the engineers of the Chicago Association of Commerce Committee on Smoke Abatement and Electrification. This shows a decided improvement over the conditions recorded by the city smoke commission three years ago, when the average density was reported as 23.3 per cent. The percentage gives the ratio of actual performance to worst possible performance; that is, if a locomotive emitted dense black smoke all the time this record would be reported at 100 per cent. If it gave out no smoke at all the percentage would be zero. The figures give the results of innumerable observations covering the entire city, designated as Zone A, and also a zone beyond the city limits, designated as Zone B.

The committee's records covering all observations of locomotives are as follows:

In terminal yards and round houses.

Zone A (52 locations)	11.77 per cent.
Zone B (14 locations)	18.97 per cent.
Zones A and B combined	12.56 per cent.

In general service.

Zone A (comprising 141 divisions)	19.31 per cent.
Zone B (comprising 91 divisions)	26.02 per cent.
Zones A and B combined	21.12 per cent.

In yard service.

Zone A (71 yards)	16.7 per cent.
Zone B (27 yards)	23.4 per cent.
Zones A and B combined	18.2 per cent.

The total average in Zone A is 14.92 per cent. The average for Zone B is 19.12 per cent.

The grand total for Zones A and B is 16.42 per cent, which is the average density of locomotive smoke in the entire field covered by the investigations.

While figures are not available for an exact comparison, the recent reports of city smoke inspectors give even lower averages of smoke production, but the higher figures of the committee's engineers are held to be the result of a more exhaustive investigation, substantiated by voluminous records giving one minute interval observations for every half mile of track in the territory under surveillance.

The method of the committee has been to station its observers at an average distance of one-half mile apart along the line under observation at a particular time. Every effort is made to keep the knowledge of the presence of the observers from the enginemen, lest such knowledge have the effect of causing temporarily improved performance. The observers make records every minute of each locomotive in sight, and in this way a train going the entire length of the line is in turn observed by each observer stationed along the line.

The average density of smoke from stationary stacks in the city limits was reported as 10.27 per cent.; outside the city limits 25.97 per cent.; total average 13.08 per cent.

Steam vessels in Zone A are reported at 14.64 per cent.; in Zone B, 26.82 per cent.; the total average being 15.47 per cent.

BID FOR BOLIVIAN RAILWAY CONSTRUCTION.—The Bolivian government has received bids for the construction of a proposed line from Potosi in southwestern Bolivia northeast to Sucre, about 65 miles. These bids will be submitted to the Bolivian congress.

"CONTINGENT SCHEDULES" ON THE VIRGINIAN RAILWAY.

An Interesting Scheme for Simplifying the Work of the Train Despatcher and Greatly Diminishing the Flagman's Duty.

On two divisions of the Virginian Railway for the past 13 months freight trains have been relieved of a large part of the work, formerly put upon them, of protecting against following trains by flag, and the despatchers have had their work simplified and lessened, by the use, for extra freights—that is, for substantially all through freights—of printed schedules, prescribed in advance, like a time table. James Berlingett, assistant general manager of the road, has given us the following account of this very interesting experiment:

It is claimed for the contingent schedule plan, verified by a year's experience in actual operation, that it lessens the labor and responsibility of train despatchers and trainmen; does away with unnecessary flagging, cuts down delays and reduces overtime; and at the same time provides the safest, simplest and most natural method for moving trains against each other on single track. [The Virginian does not use the block system.]

It throws out all imaginary (non-existent) trains; and men who are out on the line in charge of trains are put virtually on the same footing with the train despatcher as to knowledge of existing trains and when a train may be expected at any given point.

As a result of the situation last mentioned the somewhat remarkable condition is brought about, that any one of the following presumably irregular things could take place without jeopardizing the safety of the trains involved, regardless of opportunity for intervention on the part of the train despatcher.

1. Either one of two opposing extras could keep moving and overlook or disregard the existence of the other.
2. A train order fixing a meeting point for two extras could be delivered to either one of the two trains and fail of delivery to the other.
3. Train order signals could be passed, and both trains fail to receive the order.
4. The train despatcher in starting an extra from a terminal could overlook the existence of an extra, or extras, moving in the opposite direction.

The system, in strict conformity to the wording and intention of Rule 99, requires flagmen to go back "When a train stops or is delayed, *under circumstances in which it may be overtaken by another train.*" It does not require a flagman to go back under circumstances where a train *cannot* be overtaken by another train (meaning, of course, when there is no train following).

The usual interpretation given to Rule 99 (leaving out the question of block signals) is to the effect that a train when stopped or delayed, is under all circumstances liable to be overtaken by another train, and must, therefore, be protected. This is due to the condition that the train despatcher has authority to run extras at all times, without giving notice to other trains running in the same direction.

As a matter of fact, a flagman has served no useful purpose unless he has actually stopped or warned a train which otherwise would have come in collision with the train he is protecting. If no train was stopped or warned his act, measured by accomplishment, was entirely superfluous, resulting only in lost motion, needless expense and unnecessary delay.

To overcome the time and labor lost as a result of flagging against phantom trains of the same direction and getting help against opposing trains which do not exist, is the primary object of the contingent schedule plan.

If the rules permitted only the running of regular trains it is obvious that only regular trains would have to be protected against; or if the rules prohibited the running of extras except by known enumerated schedules, with time at all stations it is equally plain that to protect when no regular or extra train is due would be a waste of energy.

DESCRIPTION.

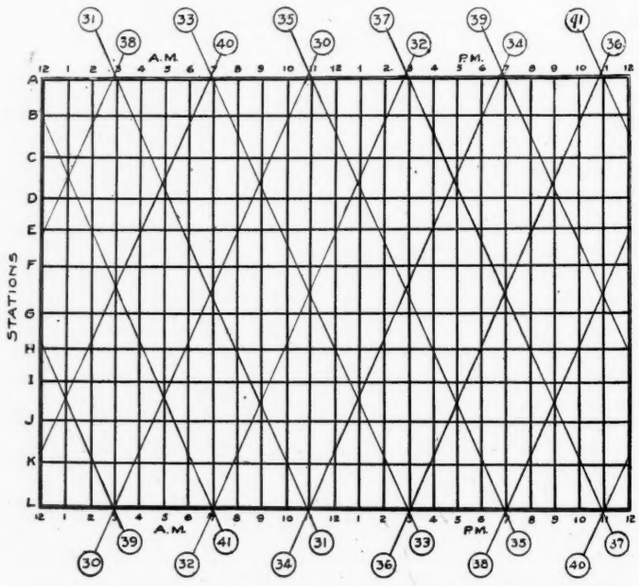
A "Contingent Schedule Card," containing numbered schedules for extra trains, with special instructions and rules governing, is made up in form similar to a time table and distributed to all concerned, the usual form of acknowledgment being required. This, however, is entirely distinct from the time table and its schedules are used exclusively for extra trains, and only by proper train authority.

The schedules are operated on uniform intervals from terminal to terminal, that is, they are run exactly one, two, three, four or more hours apart (according to the number of schedules required to accommodate traffic) and the time is so indicated at all stations. If six schedules in each direction are required they would be shown four hours apart. If twelve are needed they would be shown two hours apart. The object of the uniform interval is to simplify computation. For instance, if the card is made up with six schedules in each direction, an extra running by schedule would not be required to protect against a following extra until it became four hours late. A conductor never requires help against an opposing schedule, unless he is advised that it is being used by a train; otherwise it is disregarded. Enough schedules should therefore be provided to easily take care of traffic, as added schedules do not cause confusion or additional work.

In making up the schedules the time of regular trains is disregarded and no attempt is made to adjust the time so as to force meeting and passing points for extras at stations, either with regular trains or with each other. The object of this is to preserve the feature of uniformity of speed, and of interval previously mentioned, and to prevent unnecessary delay in waiting for time when an opposing train is not running, or is late. It also admits of the changing of the time of regular trains when a new time table is issued without disturbing the contingent schedule card.

A schedule card representing meeting points as apparently taking place between stations is unique, but it should be noted that it is only schedules that do so, not trains. A schedule simply *restricts* the movement of a train; it *does not give authority to run against a superior train.*

The operation of the system will perhaps be best understood



Arrangement of Contingent Schedules; Virginian Railway.

by quotations from the rules and reference to the accompanying chart.

SPECIAL RULES AND INSTRUCTIONS.

"Regular trains must be cleared or protected against by contingent schedule trains in the same manner as is required of other extras by time table and the book of rules."

Definitions.

"Contingent Schedule Card—A printed form containing schedules upon which extras may be run, subject to the rules governing same, when authorized by train order."

"Contingent Schedule—A schedule on a contingent schedule card showing time at different locations and stations, governing the movement of contingent schedule trains."

"Contingent Schedule Train—An extra, as referred to in these rules, authorized to run on a contingent schedule card."

Explanatory Notes.

"Rule No. 1—Unless otherwise instructed third class trains and contingent schedule trains will not be required to protect their rear against extras following of which they have not been advised, except trains passed and contingent schedule trains of later time than their own time. They will protect rear as prescribed by Rule 99 against all extras of which they have been advised; all trains passed; all regular trains, and at all times when a contingent schedule of the same direction of later time than their own time is due; and when within the designated limits of work extras."

Explanation. This rules relieves a contingent schedule train, when not otherwise instructed, from protecting against extras following unless it falls back to the time of a later schedule, which, on a six schedule card, would be when it became four hours late. No following extra can be run until the next schedule is due unless the despatcher has given notice to all contingent schedule trains and third class trains of the same direction then on the road. Third class trains are given the same protection as contingent schedule trains. Other regular trains, and extras not run by schedule must at all times protect as prescribed by Rule 99.

"Rule No. 3—When no meeting point is provided by train order, contingent schedule trains and other trains will take the siding for and clear the time of all opposing contingent schedule trains of which they have been advised by train order, five minutes.

"A contingent schedule from an opposite direction will be disregarded, when not advised that it is being used by an opposing train."

Explanation—Rule No. 3 is consistent with standard rules and practice, as applied to the movement of extras on single track. When there is knowledge of an opposing extra it must, unless otherwise provided, be avoided. In the absence of such knowledge it is presumed that there is no opposing extra to avoid.

According to the practice on most railways, opposing extras are advised of each other through the medium of train-order meeting points. Under the contingent schedule plan, they may receive such notice either in the form of a train order meeting point, or by train order giving information that an opposing schedule is being used.

Superiority by class and direction does not apply between contingent schedule trains; therefore, if two opposing trains are advised of each other they must clear each other. If only one is advised, the one not advised, would, in effect, become the superior train and would disregard the other; as opposing schedules are disregarded when not advised that they are being used.

When meeting by train order the westward extra takes the siding.

"Rule No. 4—A third class train or contingent schedule train must not leave its initial station or starting point if a third class train or a contingent schedule of the same direction and later time than its own time is overdue, without an order to run ahead of or follow or disregard the overdue train or schedule.

"The train of later time must be given a copy of the order. An order to run ahead of a train does not relieve the train ahead from protecting against the train following."

Explanation—The object of Rule No. 4 is to prevent a train of an earlier schedule from leaving its terminal behind a train of later schedule, without its being known to the men in charge of the latter. In the absence of such information it would be assumed that the train of earlier schedule had already gone, or that the schedule was not being used, consequently the train of later schedule would not protect against it.

"Rule No. 6—A train (except first class) must not leave a station unless the conductor has positive knowledge that his train has not been passed by a third class train or contingent schedule train of the same direction, except a train or trains authorized to do so by himself. This rule will govern contingent schedule trains and other extras and regular trains of every class except first class."

Explanation—The intent of Rule No. 6 is to protect the rear of a contingent schedule train or a third class train in event of its having passed another train without knowledge of the fact, which might result in failure to protect rear against the train passed.

"Rule No. 8—Non-contingent-schedule extras, and regular trains other than third class, must expect extras to be following at all times and when stopped or delayed must protect in the manner prescribed by Rule 99."

"Rule No. 11—When a contingent schedule card indicates a meeting point for two opposing contingent schedules between two stations the time at both stations will be shown in full faced type."

Explanation—The feature of schedules meeting between stations has already been explained. This, of course, is not compulsory, as the time may be so adjusted as to show meeting points at stations if considered preferable.

"Rule No. 13—Contingent schedules date from their initial stations daily and are in effect twelve hours after their time at each station. A contingent schedule train, when twelve hours behind time at any station, loses all right and can thereafter proceed only as authorized by train order."

"FORMS OF TRAIN ORDERS. (Supplementary.)

"Form R—Authorizing a Contingent Schedule Train."

Examples.

"(1) Eng. 151 run extra on C. S. 31 of May 17th."

"(2) Eng. 153 run extra E to H on C. S. 33 of May 17th."

"Under example 1 the extra specified will run on the contingent schedule named from its initial to its terminal station."

"Under example 2 the extra will run only between the two stations named."

"When the words 'Protecting Rear' are added to an order, the rear of the train concerned must be protected as prescribed by Rule 99 within the limits specified, expecting extras following at all times."

Explanation—Assuming that Extra 151 (Example 1) is to run from A to L (westward) the order would be addressed to engine 151 at A, also to all eastward extras at L and to all eastward contingent schedule trains then on the road between L and A. Engine 151 would also receive copies of all running orders then in effect which had previously been issued to eastward extras; the same having been placed at A addressed to all westward extras. Opposing trains are now all advised of each other and would clear each other.

Meeting points with eastward extras not running by schedule, if any, must, of course, be provided for before extra 151 can leave A; but orders providing meeting points with opposing contingent schedule trains should be postponed until the trains have approached sufficiently near to each other to give assurance that the order will not have to be changed.

The manner of handling as explained is the method adopted on the Virginian. The system itself is capable of great flexibility. It may be used for protecting rear only, cutting out the opposing

train feature, or vice versa. Or, if preferred, it could be arranged so that only one of two opposing contingent schedule trains would receive notice of the other, in which event only one would be required to clear.

It is believed, however, that the double notice is preferable, as it is through the process of clearing each other that the multiple guard against irregularities previously mentioned is brought about. Two trains clearing each other ought to be safer than for only one to clear, as is ordinarily practiced.

Forms are also provided for: meeting orders; time orders (to run a train late on a schedule); disregard orders (for disregarding a schedule) and for work extras. Work extras protect against a contingent schedule when advised that it is being used; other schedules are disregarded unless the work extra is directed to "Protect against all contingent schedules," which is the form of order most commonly used.

RESULTS.

The first contingent schedule card was put into effect on the First and Second divisions out of Norfolk August 27, 1911, and

CONTINGENT SCHEDULES FOR EXTRA TRAINS—NOT FOR

First Division—Sewalls Point and

SUPERIORITY BY DIRECTION DOES NOT APPLY BETWEEN CONTIN

WEST BOUND.					Miles from Norfolk	Contingent Schedule Card No. 2. STATIONS.	Car Capacity of Sidings	
55	51	49	45	41				40
P.M.-l 11.00	P.M.-l 7.00	P.M.-l 3.00	A.M.-l 11.00	A.M.-l 3.00	9.7	SEWALLS POINT	Yard	A.M.-a 10.55
						7.4		
11.30	7.30	3.30	11.30	3.30	2.3	TIDEWATER		10.20
						2.2		
11.40	7.40	3.40	11.40	3.40	4.5	CAROLINA		10.10
						2.9		
11.55 PM	7.55	3.55	11.55 AM	3.55	7.4	SOUTH BRANCH	102	10.00
						7.6		
12.20 AM	8.20	4.20	12.20 PM	4.20	15.0	ALGREN	86	9.35
						8.5		
12.55 50	8.55 45	4.55 42	12.55	4.55 53	23.5	SUFFOLK	138	9.10
						4.3		
1.10 50	9.10 45	5.10 42	1.10	5.10 53	27.8	KENYON	33	8.45
						5.1		
1.30	9.30	5.30	1.30	5.30	33.9	BOAZ	80	8.25
						7.5		
1.55	9.55	5.55	1.55	5.55	41.4	BURDETTE	80	7.55
						5.1		
2.15	10.15	6.15	2.15	6.15	46.5	SEDLEY	44	7.35
						7.8		
2.45 52	10.45 50	6.45 46	2.45 42	6.45 46	54.3	SEBRELL	113	7.10 41
						7.2		
3.20 52	11.20 50	7.20 46	3.20 42	7.20 46	61.5	JOYNER	80	6.20 41
						5.3		
3.40	11.40 PM	7.40	3.40	7.40	66.8	GRAY	42	6.00
						6.9		
4.05	12.05 AM	8.05	4.05	8.05	73.7	JARRATT	90	5.35
						7.0		
4.30 46	12.30 52	8.30 50	4.30 46	8.30	80.7	PURDY	46	5.10 55
						6.3		
5.00 46	1.00 52	9.00 50	5.00 46	9.00	87.0	ADBIT	80	4.50 55
						4.9		
5.15	1.15	9 15	5.15	9.15	91.9	DOLPHIN	80	4.35
						6.4		
5.35	1.35	9.35	5.35	9.35	98.3	ALBERTA	80	4.10
						8.2		
6.00	2.00	10.00	6.00	10.00	106.5	DUNDAS	87	3.45
						6.9		
6.25	2.25	10.25	6.25	10.25	113.4	KENBRIDGE	91	3.20
						6.3		
6.50	2.50	10.50	6.50	10.50	119.7	VICTORIA	Yard	3.00
A.M.-a	A.M.-a	P.M.-a	P.M.-a	A.M.-a				A.M.-l

Part of a Table of Contingent Schedules.

has been in continuous operation since that time. It has been a success and gives general satisfaction. There have been no collisions or misunderstandings, and but one disputed point has been brought up for decision. The plan has been easy of comprehension by everyone. "Clear all opposing trains you know about, and protect when four hours late," has proved sufficient understanding for all ordinary circumstances.

The effect has been to expedite the movement of trains over the road; to greatly reduce the number of cautionary torpedoes run over which have been placed and left by flagmen who have been recalled; to cause enginemen to give closer observance to cautionary signals (torpedoes) knowing that they have more than a perfunctory meaning; and, above all, by introducing natural methods to cause men to flag when flagging is necessary. It is as much against human nature for men to deliberately neglect flagging duty when they know a train is approaching, as it is in line with human nature to take a chance when satisfied in their own mind that no train is following.

The even spacing of trains, when it can be done, is believed to greatly lessen possibility of collision.

The time allowed on the contingent schedule card between any two stations is exactly the same for all trains going in the same direction, but the time allowed for trains of the opposite direction may be more or less, according to grade or other conditions.

A statement recently prepared covering a certain number of weeks showed that of 596 trains run, only 60, or approximately one in ten, would require rear end protection when stopped.

On the two divisions, aggregating 248 miles of road, both being controlled by one set of despatchers, the average total number of trains is 20 a day; including the trains on the regular time table, contingent schedule card, work and other incidental movements. The number of train orders under normal conditions amounts to from 60 to 75 for each 24-hour period. Usually each contingent schedule is used every day.

The number of orders is not less under the contingent schedule plan, but the despatcher's labor is less, as the orders are shorter. The added safeguards thrown around the movements of extra trains is a relief to the despatchers.

Meeting orders are less frequent than under the old system, for the reason that extra trains moving under their contingent schedule rights can be allowed to close up within a few stations of each other and the despatcher can then select the logical meeting place. This practice obviates the necessity of making changes in the place of final meeting. This in turn lessens the likelihood of confusion and adds to the safety of train movements. A great many accidents occur on account of confusion and misunderstanding arising from frequent changes in meeting orders.

Taking an average day's train order work of the despatcher: of a total of 64 orders issued, 36 were meeting orders and only two of these meeting points were changed.

Where schedules meet between stations, the despatcher issues a positive meet; provided both trains are informed of each other. For example: the chart shows schedules 30 and 31 as meeting between F and G. If both schedules were being used, each train would be informed of the other, and they would clear each other. Consequently, unless a train order meet is provided, No. 30, if on time, would clear No. 31 at G, and No. 31, if on time, would clear No. 30 at F. But the despatcher, of course, provides a meeting place when the two trains have approached reasonably close to each other. If only one of the two trains were informed of the other, the one having notice would clear and the one not having notice would disregard the other. In such event a train order meet would not be necessary, but would be optional with the despatcher.

The notice putting the system into effect said in part:

The object of the contingent schedule card is to arrange so despatchers may at their discretion authorize extra trains to run on schedules, and by so doing provide a means whereby trains so authorized may be partially relieved from unnecessary flagging. It is also believed that it will result in a considerable improvement in method, and add to safety, in the handling of extras when moving toward each other from opposite directions.

Contingent schedule trains will display white signals and cannot run without train order authority in the form prescribed by the special rules.

On train registers contingent schedule trains must be shown as extras, adding the contingent schedule number.

Do not overlook regular trains; clear them.

Do not leave a station ahead of time.

Guard against passing a train without having knowledge of the fact, with the possible result of failing to protect against it.

Protect rear as described by Rule 99 (train rules):

When on the time of a later contingent schedule.

When any train is passed.

When advised of an extra of the same direction which is not running on a contingent schedule.

When within designated work train limits, before as well as after meeting or passing the work train. . . .

When you fail to clear a following regular train.

Do not leave a starting terminal if on the time of a later contingent schedule of the same direction without an order to run ahead of, follow or disregard the later schedule.

Do not pass a contingent schedule train or other extra of the same direction unless authorized by its conductor.

Remember that a contingent schedule train loses all right when 12 hours late.

Regular trains and non-contingent schedule extras must expect extras to be following at all times and protect as prescribed by Rule 99.

Contingent schedule trains and other extras, in either direction, when advised that an opposing extra is running as a contingent schedule train, must take the siding for and clear its time five minutes, unless a train order meet is made.

When meeting by train order the westbound extra will take the siding, except as provided by special rule 25.

Both trains may be advised of each other, in which event they will clear each other.

A copy of the running order of the opposing train is sufficient notice.

Care must be used to establish the identity of a train to be met or cleared, to avoid mistaking an unexpected, for an expected train.

Meeting and passing points with regular time table trains are not indicated or provided for. They must be cleared.

INSPECTION OF STEEL RAILS.

BY ROBERT JOB,

Vice-President, Milton Hersey Co., Ltd.; Chemist, Lehigh Valley.

The study of steel rails and of causes resulting in defective service has been given wide attention throughout the country, in view of the increasing number of failures and the need of knowing definitely whether these failures were due to laxity in the process of manufacture of the steel. This study has proved unquestionably that many failures were the result of weakness in the steel caused by defective manufacture in some part of the process, and it is of great practical importance to every railway, and equally so to the traveling public, not merely that the defects in mill practice which have been found to result in the failures be remedied by the mills, but also that the inspection at the mill by the railway be of such character that it will be possible to determine commercially whether or not the steel in a given lot of rails offered for inspection is thoroughly safe and serviceable, and what rails, if any, in the lot are unsafe and undesirable for service.

Until comparatively recently the practice of most roads has been to leave the supervision of the process largely to the manufacturer, making only a surface inspection to see that the rails were in line and free from any defect apparent to the eye. A marked exception for many years to the above practice has been that of Dr. P. H. Dudley of the New York Central, who by dint of systematic study of the problem throughout the process of manufacture has succeeded in greatly bettering the quality of shipments to his lines.

About 15 years ago, while the writer was chemist of the Philadelphia & Reading, a careful study of rail failures and of inspection methods was begun and a plan was gradually developed which has been in operation there since that time. This plan, then, was to continue the surface inspection as usual, but in addition to have at least one extra man in the mill while rolling was in progress, whose duty it was to keep a general supervision over the process of manufacture, and to call attention to any defective conditions of practice which were observed. It was his duty, for example, among other matters, to watch the extent of the cropping, and as far as possible to make certain that sound metal was secured—to see that the test-butts cut for the drop tests were actually taken from the top of the ingot, or from the bottom, as specified, and not from the middle of the ingot where the steel was liable to be more sound and less likely to fracture under the tests; to see that the temperatures specified were observed, etc.

At that time drop tests were made regularly by few roads, and then they generally tested only one butt from every five heats. This test butt was generally selected by the mill people and the test was often made by them, for the simple reason that the time of the surface inspector, who represented the railway, was fully occupied at the loading beds, and it was, therefore, a physical impossibility that he give more than a very limited oversight to other details of mill operation. As a consequence he was generally obliged to accept the mill record of such tests as were specified. Under such conditions, it is almost needless to remark that rejections, apart from those resulting from the surface examination, were few, particularly so since, unfortunately for the road, the mill men were paid upon a tonnage basis.

In the course of our work, it was also found to be necessary that the inspector should himself see that the borings taken for check analysis came from the ingots represented, in order that he might be able to vouch for the identity of each sample. This practice was adopted because occasional mistakes occurred at the mills, and as a result of such errors, rails were sometimes offered for inspection when the composition was radically different from that specified and from the analysis handed to the inspector upon the mill test report. Under our plan such errors were detected by the check analyses and the rails in question were rejected.

At first the mills vigorously opposed the plan of testing each heat under the drop, maintaining that one test in five heats was ample to protect the quality. We contended, however, that individual heats were liable to vary decidedly, both in composition and in physical properties, and that one test taken from every five heats gave no indications as to the quality of the intermediate four heats, and that the most ordinary common-sense prudence dictated at least one test from every heat. In those days open hearth rails could not be obtained commercially, and the number of ingots in a Bessemer heat was low, so that one test from every heat gave a fair idea of the general character of the heat, provided, of course, the test butt was taken from the top of the ingot, or from the bottom.

The plea for a test of every heat was rational and thoroughly practicable and within a short time it became the standard practice upon the Reading, so that the additional inspector saw, as stated above, that the test-butt was selected from the top of the ingot, or occasionally from the bottom, the object, of course, being to take for test the portion most liable to be defective.

The plan briefly described above, carefully followed at each inspection and gradually developed, was of decided help in improving the quality of the rails, increasing the life and lessening the failures. The same system has also been the practice of the Lehigh Valley for a number of years, and upon the latter road in the fall of 1911, the system was still further developed by another increase in the number of inspectors, as noted in the *Railway Age Gazette* of June 7, the object being to supervise still more closely each successive step in the course of the manufacture and to detect any variation liable to result in defective quality. Also, the "test-by-ingot" system was then adopted, stamping each rail with the ingot number as well as with the heat number, and testing butts from six ingots taken at random for each heat. This plan of stamping each rail with the ingot number was a new departure in rail inspection, but it quickly proved its utility, and has since been followed by other roads. We adopted it because, as a result of the study of rail failures, it was clear that in many cases individual ingots only were at fault, and we foresaw that it would be of great advantage to be able to identify definitely all of the rails from any given ingot if any defect developed either in the test of the rails at the mill or subsequently in service.

During recent years there has been a rapid increase in the

use of open hearth steel rails, and as the tonnage in a single heat by the open hearth process averages fifty tons or more, the test of six ingots from each heat represents roughly about the same proportional frequency of test as formerly in one test from each Bessemer heat. Only six ingots were tested from each heat under our plan last year, because the mills claimed that if a larger number of tests were made delay would be occasioned, and consequently the speed of rolling and the tonnage of the mills would be reduced. We found, however, after having over 10,000 tons of rails rolled at a number of mills under this new plan, and making tests of six ingots from every heat, that even with a very slow drop testing machine, ten ingots from every heat could have been tested readily without blocking the tonnage in the least, and it was also clearly apparent that if the drop testing machines were made to operate as rapidly as is the practice at some mills, every ingot in the heat could have been tested without causing delay. As a matter of fact, also, only slight changes are needed in the present drop testing machines at some of the mills in order to speed them up to modern requirements.

The "test-by-ingot" plan which we adopted last fall has proved very satisfactory, and has been of great help in weeding out occasional abnormal ingots in a heat, for in several instances where a defective rail was detected, other rails from the same ingot were tested and were found to contain the same defect. In such a case, the rails from that ingot only, about four in number, were rejected, instead of rejecting an entire heat, as would otherwise have been necessary under the old system.

A test of six ingots, or of ten ingots, from each heat, though a decided improvement upon the old system, is, however, not by any means an ideal method, and our plan as at first proposed last year was to test a butt from every ingot, accepting the good ingots and rejecting only those which failed, unless the proportion of rejections in a given heat was so large as to cast doubt upon the integrity of the heat as a whole, in which case the entire heat was necessarily rejected. Such a plan is logical and in our recent rollings it has been proven thoroughly practicable with trifling changes in the drop testing machines at some of the mills. Under the old system, in use upon most roads today, one rail butt is selected at random from each heat for the drop test. If this butt fails, two others are taken from the same heat and the entire heat is either accepted or rejected, depending upon the result of the test. Under these conditions, individual defective ingots are accepted, and later on cause trouble in track, while under our plan of numbering each rail with its ingot number and with the heat number, and making the test of each ingot, it is possible to reject an occasional defective ingot and to accept and put in service all the ingots which are of good quality. From observation of its working, we are satisfied that the plan will be of decided advantage to the mills since its natural effect will be to keep at the bare minimum the number of rejections, or in other words, to reject only occasional ingots which would be likely to give defective service, and to utilize to the fullest extent all of the ingots in the heat which are of normal quality. The plan, we believe, will benefit the railways equally since it enables inspectors to identify and to reject individual rails which are defective, with far greater certainty than would otherwise be possible. Furthermore, the new arrangement is obviously much more fair and rational than the old plan under which bad ingots are accepted with good ingots, while good ingots are rejected with bad ingots.

Another advantage which occurs through the adoption of the system of stamping rails with the ingot number as well as with the heat number, and with the letter designating the location in the ingot, is sometimes seen in a case where a defective rail is detected in track. In such a case, if the defect is radical, and if each rail from the ingot cannot be identified, it may be necessary to remove the entire heat from track, or in any event to make tests of a considerable number of rails from the same heat as a precaution, in order to be certain that the defect is not characteristic of the heat. For example, if the ferro-manganese is not thoroughly melted and mixed, the composition of an ingot or of several ingots in a heat may vary decidedly, and the proportion of manganese in an individual rail may be so high that it would be prudent to remove the rail from track. In case, then, on further investigation, other rails were found in the same heat in the same condition, the entire heat should properly be removed from track, and as the defect in question was clearly due to defective mill practice, the heat should properly be returned to the mill for replacement with steel of proper quality. If, on the other hand, the rails had been rolled under the new plan, each rail being stamped with the ingot number, all of the rails from the defective ingot in question could be readily identified and removed from track. Tests could then be made of rails from the other ingots in the same heat, and it could be determined with comparatively few tests whether or not ingots in the heat were similarly affected, and just what rails, if any, should be removed from track. Under this plan the loss to the mill would be far less than otherwise, as would also be the labor loss to the road in removal of the defective material.

A corps of inspectors was trained on the Reading for the work upon rails and other materials. These men were connected with various departments of the road, were given the necessary instruction, and were called upon when inspection was required. The results obtained were very satisfactory, yielding high efficiency at a minimum cost to the road. The same plan has also been in effect upon the Lehigh Valley for a number of years with equally satisfactory results.

Under present conditions of mill practice in this country, and with modern rails often weighing 100 pounds or more per yard, it is by no means the simple proposition that it is sometimes assumed to be, to test an output of 500 or 1,000 tons per day in such manner that some hidden defect in an individual rail may be discovered and the rail be barred from service.

Many methods of tests at the mill have been proposed or have been tried in the past in the effort to safeguard the quality of the rails. Some of these give valuable indications and are of great practical utility. Others are of equal benefit when applied to a small daily tonnage, but are inadequate under modern conditions, because the tests cannot keep pace with the output of the mill. The drop test with various modifications has long been recognized as a standard method of test. It has sometimes been criticized as a rough-and-ready test, brutal in a measure, which fails to give much information which is desired regarding the quality of the steel. This is true in part, but it is equally true that the drop test properly made is unexcelled as a rapid and practical test by means of which any tendency toward brittleness may be detected with certainty. By this test we can also measure the elongation of the steel, its ductility, by Dr. Dudley's feasible and efficient method, and likewise the hardness of the steel by taking the deflection under the drop. Also, if the rail butt is tested head downward, as is our regular practice, serious defects in the head of the rail which would impair safety can be detected, while also the test may even be utilized in determining whether the steel is seamy and liable to develop fractures in the base, by simply testing the rail-butt base upward as described above, but tilted slightly to one side, so that the drop will first strike upon one side of the base, and thus open up, as a result of the blow, any unwelded seam which may be present. This modification would not interfere with the effectiveness of the drop test in other respects, and we think it well worth development as a method of test.

RAILWAY CONSTRUCTION IN THE MALAY STATES.—The East Coast Railway, from Gemas, Malay States, northward through Pahang, is being rapidly pushed toward the Kelantan border, and the survey is now being made for the line through Kelantan which will connect the Federated Malay States Railways with the South Siam Railway, now under construction. During 1912 work will be begun on two branch lines, one from Padang-Java to Kuala Selangor, and the other from Bukit Mertajam to Alor Star, in the province of Kedah; the two lines comprise 89 miles.

RAILWAY ELECTRICAL ENGINEERS' ASSOCIATION.

An account of the opening exercises and committee reports of the first two days of the convention of the Association of Railway Electrical Engineers was published in our last week's issue, pages 794-5. The following completes the report of the convention:

STEAM TURBINES.

A paper on the Commerical Efficiency and Application of Small Steam Turbines was presented at the Wednesday afternoon session by W. J. A. London and Ashley P. Peck. A brief abstract follows:

As a general rule, the small turbines are applied to the auxiliaries of a plant, such as exciters, boiler feed, circulating and hot well pumps, where the exhaust steam may be used in the feed water heaters or for other purposes; in such instances the efficiency of the turbine may be sacrificed to gain additional reliability, for the ultimate thermal efficiency will be high. Less work is required in the care of these units than in the ordinary reciprocating engines and they stand considerable hard usage, instances being known where turbine pumps have run while completely submerged in water. As prime movers for generators for power and light the turbine has the advantage of occupying small floor space, requiring little attention and no adjustments during long periods, and maintaining its original efficiency. They may be successfully applied to direct current generators, using 500 volts or less.

In the discussion of this report the question of exhaust or low pressure turbines was considered and it was pointed out that where there were sudden demands for current presenting several peak loads throughout the day the exhaust turbine was not a valuable adjunct. However, in the case of an evenly loaded plant, such as a manufacturing plant or a railroad shop, an exhaust turbine will prove economical. Several installations were mentioned, among which were those of the Baldwin Locomotive Works at Philadelphia, the Norfolk & Western, and the Illinois Central at Burnside. Ill. In all cases, however, where the exhaust turbine is to be considered the conditions must be carefully studied for the exhaust steam from a reciprocating engine may be used for various purposes and it should be determined as to whether it would prove more economical in the turbine or for these purposes.

INDUSTRIAL LIGHTING.

In a paper on Industrial Lighting by B. F. Fisher, Jr., several important points concerning shop illumination were considered. In the first place, the problem should be very carefully studied as to the location, reflection and power of the lamps. They should be so located as to provide the light where desired and as efficiently as possible. In many old installations a large part of the light is absolutely wasted by being allowed to diffuse too generally over areas where it is not needed.

The arc light and high power incandescent lamp were recommended for general use in rooms with high ceilings, the arc or mercury vapor lamp for medium high ceilings and the mercury vapor and incandescent lamps for low ceilings. In the case of the medium ceiling, the mercury vapor lamp was recommended in preference to the arc when it was desired to eliminate sharp shadows. The proper diffusion of light may be obtained by using the necessary deflectors and by their use the power required for lighting may be greatly reduced. The power of the lamps should be as high as possible to give the desired illumination. Of course, different problems will require different arrangements and numbers of lamps. Cases where shadows are very undesirable will require a larger number of lights than where the shadows are not considered and they will be of less power, but where it is desired to increase the illumination it should be done by higher power lamps rather than by increasing the number of low power lamps.

The comfort of the employees should be considered. It will be found that artificial illumination at dawn, twilight or gloomy weather will require considerably more candle power than after dark, and shops operating under those conditions should be equipped to give that extra amount of light. Much may be gained by the proper arrangement of the circuits; for instance, where a shop works through from daylight to darkness, as many do in the winter months, the circuits should be arranged parallel to the windows so that at the beginning of darkness the circuit in the center of the shop may be turned on first and so on out to the windows.

Care should also be taken in the original lay-out of a shop to provide for any change in the location of the machinery; in other words, the units should be so located that a machine may be operated with equal efficiency, as regards light, from any angle.

Another important point brought out was that of keeping the lights and reflectors clean and free from dust and dirt, for it is very easy to lose 50 per cent. of the original illumination in this way. A man should be commissioned to keep both the reflectors and the lamps clean, washing them with soap and water, if the full benefit of the lighting system is to be realized. The lamps should be located where they will not become spattered with oil or grease or other dirt.

POSTAL CAR LIGHTING.

A. J. Sweet presented a paper on Postal Car Lighting, in which he mentioned shadows, light in the eyes of the mail clerks, specular reflection, and the intensity of light, as being four important points to be considered. The shadows may be somewhat eliminated by the correct location of the light units. The lights should be high enough so they will not shine in the eyes of the men. The specular reflection may be greatly reduced and almost eliminated by sufficient diffusion of the light and this is best obtained by the indirect lighting system, which, however, has not been found practical in postal car service. The intensity of the light should be at least 2¼ foot-candles at the reading height above the floor and 3½ foot-candles would be considered very satisfactory. The efficiency of the illumination of the car will be largely influenced by the type of reflector used on the lamps and the way in which the light is directed to where it is needed. It was shown that with various types of reflectors a light efficiency from 25 to 62 per cent. could be obtained, the 25 per cent. being obtained in the indirect lighting system and the 62 per cent. with the use of a mirror reflector. The illuminized metal reflector was rated at 44 per cent. efficiency and was recommended for use in this service as it was the only reflector that gave a high efficiency that could be considered practical, as the mirror, the prismatic and the opal reflectors were likely to be broken in cleaning due to rough handling.

Mr. Sweet recommended the 50-watt lamp as giving the best service and being more economical as to wiring, fixtures, etc. He also pointed out that the cost of perfect maintenance will more than pay for itself in the increased lighting efficiency. In other words, it would be much cheaper for the railroads to reduce their factor of safety in the intensity of light and keep the lights well maintained. A system should be inaugurated so that the reflectors to be cleaned may be replaced by reflectors already cleaned; they should be taken from the car and given a thorough washing.

C. M. Reed, chairman of the Postal Car committee for the Railway Mail Service, mentioned specification on lighting that are to be presented in the near future. He intimated that a lighting efficiency of 99⅓ per cent. would be required of all postal cars and that this would be determined from the trip failures. If a road will guarantee this efficiency, candles will be allowed for auxiliary lighting. If, however, a road does not agree to this efficiency, or if it is found that this efficiency cannot be maintained, an auxiliary lighting system will be required of either oil or gas. Mr. Reed also recommended the single row of lights throughout the ceiling. On request of several of the

members present he agreed to consider instructing the mail clerks to report any defects or items, whereby the efficiency of the equipment may be increased, directly to the inspector by means of a note directed to him and placed in a box in the switchboard locker. The system on the Lehigh Valley was spoken of, whereby the postal clerks leave notices to the inspectors in the switchboard locker and also notify conductors when anything serious is the trouble with the lighting system; in this way it is possible for the conductor to wire ahead for an electrical inspector to board the train and correct the difficulty if possible. It was clearly shown that the Postal Car committee on the part of the government was ready in any way to help the railroads in maintaining the efficiency of their postal car equipment.

OTHER BUSINESS.

Committee reports were also presented on the Installation of Wiring, Improvements, Standards and Specifications. The committee on wiring considered engine houses, machine shops, engine rooms, boiler rooms, storehouses, oil houses, coal sheds, cinder pits, passenger and freight stations. In most every case the wiring was recommended to be run in conduit and that the fittings should be of the standard grades of sherardized or galvanized material. The insulation of the wire should be of high quality rubber, paper or varnish cambric, and all the wiring should follow as closely as possible the National Board of Underwriters' code. It was especially brought out that considerable money could be saved by studying carefully the general problem of wiring. Under the subject of improvements a report of the several companies manufacturing axle lighting equipment, axle pulleys, belt fasteners, electric meters, ball bearings, generator connectors, lighting systems, storage batteries, car lamps and fixtures, fans, motors, electrical instruments, headlights, ventilating equipment, wire and wiring devices, etc., was presented showing the improvements made in their special lines.

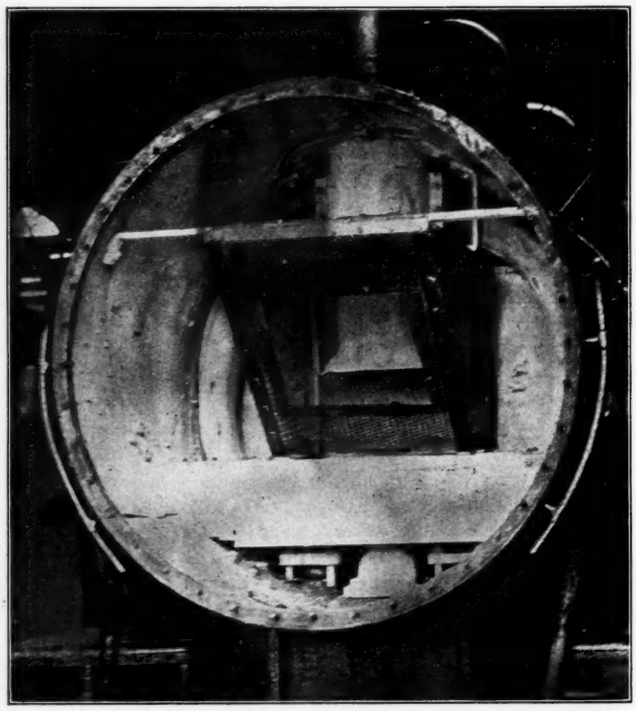
The committee on standards presented its recommendations in contrast to those recommended by the M. C. B. committee on train lighting. In most every case these standards were identical, the exceptions being in the notices required on the switchboard locker, which, in the case of the Electrical Engineers, are more complete, and in the M. C. B. recommendation No. 12 was objected to. Also there was a difference of five cents in the labor cost for electrical service, the M. C. B. Association recommended 30 cents, while the Electrical Engineers recommended 35 cents. A consensus of opinion is to be obtained from the members of the association concerning other recommendations which will be forwarded to the M. C. B. committee on train lighting. Complete specifications were presented on rubber belting for axle generators, rubber covered wire and cables, and incandescent lamps which were referred to letter ballot. A paper was also presented by N. W. Storer on Electric Traction which is presented elsewhere in this issue.

The following officers were elected for the ensuing year: D. J. Cartwright, electrical engineer, Lehigh Valley, president; C. R. Gilman, chief electrician, Chicago, Milwaukee & St. Paul, first vice-president; H. C. Meloy, chief electrician, Lake Shore & Michigan Southern, second vice-president; Joseph A. Andreucetti, general foreman, Chicago & North Western, secretary and treasurer. The following executive committee was also elected: L. S. Billau, assistant electrical engineer, Baltimore & Ohio; E. W. Jansen, electrical engineer, Illinois Central; F. E. Hutchinson, chief electrician, Chicago, Rock Island & Pacific; C. J. Causland, chief electrician, Pennsylvania Railroad; Willard Doud, shop engineer, Illinois Central, and W. A. Del Mar, electrician, New York Central & Hudson River. The next annual meeting will be held in Chicago and the semi-annual meeting in Atlantic City.

ARGENTINE RAILWAY MILEAGE.—There are 19,576 miles of railways in operation in Argentina; 3,353 miles of which are state railways and the remaining 16,223 miles belong to private companies.

SLATER FRONT END.

A few years ago the Chicago & North Western, determined to reduce the fires along its right of way due to sparks from the locomotives, made a rigid investigation of the locomotive front ends; it was found that it was very difficult to keep the existing arrangement spark proof for any length of time. The intense heat and vibration developed holes in the joints between the netting and plates that allowed the cinders to pass through. An absolutely new arrangement of front end was designed and was finally adopted. The idea originated with William Burdett, foreman boilermaker on the Northern Wisconsin division, and was perfected and made practical and patented by F. Slater, master mechanic of the Peninsular division. The engines running in the wooded territory have been gradually equipped with this device since January of last year, with a remarkable decrease in the number of fire claims due to sparks from the locomotive. The amount paid for these claims was $129,250 for the fiscal year ending June 30, 1911, and $63,787 for the year ending June 30, 1912, or a decrease of about 50 per cent. While this decrease cannot be said to have been wholly due to the application of this device, the greater part of it is.



Locomotive Smokebox with Slater Front End Arrangement.

Before adopting it as the standard front end a test was made on a ten-wheel locomotive by H. T. Bentley, principal assistant superintendent of motive power and machinery, who was accompanied by Prof. J. G. D. Mack of the University of Wisconsin and E. M. Griffith, state forester of Wisconsin. It was found that over a distance of 58 miles from Green Bay, Wis., to Oshkosh the observers counted only 22 live sparks, all of which died out before striking the ground. During the test the engine was made to work as hard as possible so as to present the most unfavorable conditions.

In addition to the spark reducing feature, it has been found that engines equipped with this front end are freer steamers and that the coal consumption is materially reduced. While there have been no distinct tests regarding this point, the enginemen claim that in most cases they can cover their runs with from 5 to 10 per cent. less coal than before. This is due perhaps to the open and less restricted construction in the smokebox which

allows a freer draft through all the boiler tubes and involves less liability of the flues becoming clogged.

It was found that a larger netting area could also be obtained with this front end which also will tend toward better draft. The accompanying table shows the difference, in sq. in. of netting area per flue, between the old and the new arrangement on some of the North Western engines.

Type of Engine.	Old.	New.
Class A—4-4-0	8.566	9.64
Class B—4-4-0	7.054	8.32
Class D—4-4-2	8.375	9.77
Class E—4-6-2	6.5	9.06
Class I-2—2-6-0	11.746	12.72
Class M-1—0-6-0	11.34	12.28
Class R-1—4-6-0	8.376	11.63
Class Z—2-8-0	6.685	9.43

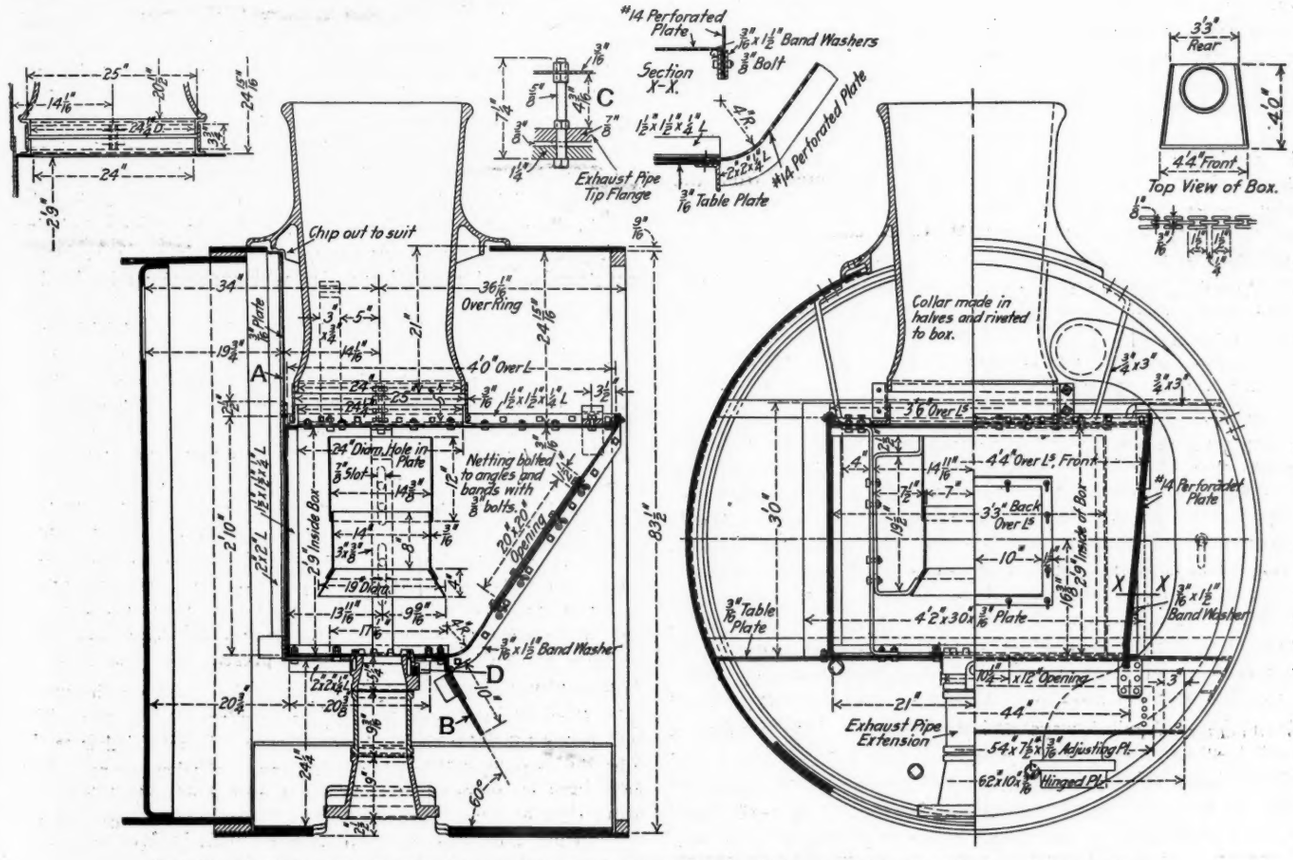
As will be seen from the accompanying illustrations, the construction of this front end is very simple and compact and is as cheap to make and install, if not cheaper, than the ordinary type of front end arrangement. It is possible to inspect all its parts without having to remove various nettings, plates, etc., and any repairs are easily made. There are no fancy or fussy joints to be made around the steam pipes. Everything is straightforward work, all parts being made to a template.

The line drawing shows the Slater front end applied to a consolidation locomotive (Class Z) equipped with a fire tube superheater, and although the method of applying the device will vary with different types of engines, the arrangment is typical. There is a diaphragm *A* of 3/16 in. plate, extending across the smokebox and down to the base of the netting box, which deflects the smoke and cinders down under the box and against the deflecting plate *B*. The sides and inclined front of the box are made of No. 14 perforated plate with the perforations running horizontally, the customary netting door being provided as shown in the photograph. A 3/16-in. table plate extends across the lower part of the smokebox on a level with the top of the exhaust nozzle. This is cut away in the center so that the nozzle may be removed; a small plate is bolted to the tip as indicated at *C*, giving an absolutely cinder proof construction.

The blower connection is made in the exhaust tip at *D* just below the bottom plate so that it will not be necessary to run the pipe through the sides of the netting box. The petticoat pipe is fixed to the top and bottom table plates. The stack and the netting box are connected by a malleable iron collar made in halves and riveted to the angle on the top of the box. A clamp collar is placed outside of this collar and is tightened so as to cover the joints in the inside collar. This clamp collar also protects this connection from abrasion due to the action of the cinders; it is shown in position in the photograph. About 70 per cent. of the engines of the North Western and practically all of those running in the wooded sections have been equipped with this front end.

ELECTRIC RAILWAY FOR CHILE.—The Chilean government has approved the plan submitted for the construction of an electric railway from Santiago, the capital of Chile, northeast to Valparaiso, the most important South American seaport on the Pacific, about 65 miles. The line will pass through Curacavi and Casablanca, and a branch line will be built from Curacavi to Melipilla. Detailed plans must be submitted to the Chilean government before January 13, 1914.

NEW LINE FOR HONDURAS.—The government of Honduras has granted a concession to construct a standard gage steam or electric railway from Trujillo, on the Caribbean sea, south to Juticalpa, about 120 miles, with an extension to Tegucigalpa, about 100 miles west of Juticalpa. Branches may be built on either side of the railway, and the concessionaire agrees to construct a wharf at the port of Trujillo. The concessionaire has the privilege of using the timber found on the government land in the construction and operation of the railway and the rivers and streams within 40 miles of the main or branch line of the railway may be made use of to generate electric power if needed by the company.


#14 Perforated Plate
3/16 x 1 1/2 Band Washers
3/8 Bolt
Section X-X.
#14 Perforated Plate
Exhaust Pipe Tip Flange
3/16 Table Plate
Chip out to suit
Over Ring
40 Over L
Netting bolted to angles and bands with 3/8 bolts.
24 Diam. Hole in Plate
19 Diam.
Inside Box
20 1/2 x 20 Opening
3/16 x 1 1/2 Band Washer
Collar made in halves and riveted to box.
36 Over L
44 Over L, Front
3 3/4 Back Over L
#14 Perforated Plate
3/16 Table Plate
4 2 x 30 x 3/16 Plate
3/16 x 1 1/2 Band Washer
10 1/2 x 12 Opening
Exhaust Pipe Extension
54 x 7 1/2 x 3/16 Adjusting Pl.
62 x 10 x 3/16 Hinged Pl.
3'3" Rear
4'6"
4'4" Front
Top View of Box.

Details of Slater Front End Arrangement as Applied to a Chicago & North Western Locomotive.

"THE HIGH COST OF RAILROADING."*

BY B. F. YOAKUM,
Chairman of the St. Louis & San Francisco R. R.

Talking about what it costs to live, I have chosen the railways as an illustration, because their prosperity or the reverse means the prosperity or depression of the whole country; and because 80 per cent. of the cost of all material bought by the railways goes to labor and the advance in the cost of doing business in this giant industry may become a menace for the future of the whole country. We find it the main issue in every wage conference between officers and men. We find it the basis of every strike, every spasm of discontent. We meet it year by year in our coal bills. We struggle with it every time we have to pass on bids and specifications for new cars, new engines, or new supplies. We tackle it again whenever we come to figure on building a new line to meet the needs and demands of the people in undeveloped sections, awaiting transportation that development may go forward. It hits us hard again in our tax bills and our payments in personal damage suits.

We come face to face with it in our dealings with the bankers and investors of the world. The era of easy money for railway building, railway improvements, railway expansion has temporarily passed away. Today, we pay five and one-half dollars in interest for the same supply of capital that, in other days on equal security, cost us only four and one half dollars. When we consider that the railway business, in the nature of things, must always be a tremendous borrower of capital, the importance and the imminence of this question of the cost of capital becomes apparent.

Under present conditions the only sane argument for favoring government ownership lies in the fact that the interest rates would be an average of 2 per cent. less per annum. On the present bonded debt this would amount to saving about 200 million dollars a year. The service to the public, the development of the country and the freight rate—would be worse than on the railway as now managed. While government management of our transportation system would probably be undesirable, the government should, in the interest of the people, do all that it consistently can to aid in the railways' credit in finding new money to carry on improvements and new railway building.

It is difficult to lay the blame for this condition upon any one in particular, yet the fact that the greatest instrument in our future development is being crippled, all thoughtful men must see. Perhaps, in our railway expansion and railway enthusiasm, we have done some things that have accelerated the decline of American railway credit, but the best critics of the world acquit the American railway of any great inflation in their bonded debt, even though they have at times criticised expansion in the stocks and junior securities.

These matters that I have cited are some of the facts. There are other facts equally important. I am not a pessimist about American railways. This year we look for apparently abundant crops, and to the high-class railway freight business that will result throughout the whole year from this abundance. Net earnings will expand and we shall have a new lease of life.

Up to the present time, there has been a constant saving in actual cost of moving freight and passengers—through the constant advance in the weight and power of locomotives, through larger cars, and through the resulting larger train loads that have been possible. That saving in expense is reaching its limit. Advance in overhead charges from this time on, according to the judgment of mechanical officers most skilled in these matters of transportation science, must be met without much further aid from the mechanical ways and devices. We have reached a period when much greater economy in transportation seems almost impossible, and if there is to be a much further reduction in cost in conducting transportation it will have to be through curtailment of service to the public.

Although our revenue-producing plant has been constantly enlarged, we have also been forced by public demands to meet a hundred other expenses that have produced no return in kind. Aside from the increase in taxes enumerated, more than 70,000 miles of road have been equipped with block signals; hundreds of miles of track lying in cities and suburbs have been elevated at enormous expense; terminals and stations have been built at great cost; the weight of standard rails has been increased from 75 to 90 lbs. to the yard to carry the heavier equipment; old stations torn down and modern stations literally by the hundreds have been built to meet the demands of the public; last, but not least, we have spent 200 million dollars to meet the cost of regulation and supervision of operations by the federal government and the authorities of the states which we serve. These are purely unproductive expenditures. They come with serving the public, and are part of the price we have to pay to live and carry on our business. They are overhead charges upon our income fixed by the government.

I write as a railway builder. The railway I helped to plan and helped to build is today employing more than fifty thousand men. Their families make up an army of a hundred and fifty thousand people who draw the support and education of their children from our pay-rolls. In the part of the country where my work has been done, railways are still needed. East of the Mississippi river, there are less than 5,000 acres of land to every mile of railway, but in the West there are more than 13,000 acres. Oklahoma is only half supplied with railways. Arkansas is barely prospected, Louisiana is short of transportation properly to develop the state. Texas needs very badly at least 10,000 miles of new line. Arizona, New Mexico, and, in fact, almost all the Western states need a large amount of railway building in the next ten years. I know that these great regions of the southwest can never come into their own until they get the transportation facilities they need. I should like to see railway building go forward. It cannot be done in a large way until the future of the railway business is clearer than it is today

This is the result from the standpoint of new construction—namely, that it has come to a temporary halt and must remain stagnant until a solution is reached.

These things must not happen. It is unthinkable that the mass of the American people desires to destroy the greatest of the constructive industries, the building of new railways. It cannot be conceived that the interest of the whole nation will be served by bringing about a condition that tends to injure the world-wide credit of the American railways to a point of saying that we do not want more railways to enable us to go on upbuilding.

A political leader strong enough to formulate a combination constructive and regulative policy will eventually take hold of this most important question and promulgate it. I fully expect to see a resumption of the building of railways, establishing new cities, the opening up of untilled lands, and patient people waiting for railways to develop their lands, coaxing thousands of producers every year into the rich, new country in which such work will be carried on. That means that a solution of the present difficulty, which amounts to a deadlock, will be found before it comes to the era of a setback.

Here is need of real constructive statesmanship. This is a problem of pure statesmanship. It is not a matter of political jobbery, of academic theory, of experimental, haphazard procedure. It is not a matter that can be settled and laid aside by political chicanery, by the expounding of academic ideas, by the piling up of bureau upon bureau at Washington, and commission upon commission throughout the land.

Practically all the legislation, state and federal, on the matter of railways in the past decade, has been restrictive, prohibitive, regulative. Some of it has been salutary. Some of it has tended to be destructive. What is needed now and what we must have if we are to go forward is in the direction of upbuilding. We have been told in a thousand ways what we must not do and dare not do. The administration of the future must tell us what we can do and show us the way to do it.

* From an article in *The World's Work* for October.

General News.

The round house of the Atchison, Topeka & Santa Fe at San Angelo, Tex., was destroyed by fire on the morning of October 16; estimated loss, $50,000.

The United States district attorney at Tacoma, Wash., has filed suit against the Chicago, Milwaukee & Puget Sound, charging violation of the hours of service law.

The Missouri Pacific has completed the transfer of its hospital property and funds to an organization of its employees. The cash turned over to the men by the company amounted to $193,768.

A. A. Krause, general claims attorney of the Missouri, Kansas & Texas, has been appointed commissioner of safety in charge of the work of the safety committees organized on that road several months ago.

The Toledo, St. Louis & Western has arranged with the Missouri, Kansas & Texas to use the freight house of the M. K. & T. in North St. Louis. The Clover Leaf in this way secures a freight terminal on the west side of the Mississippi.

The executive committee of the Master Car Builders' Association has declined to reconsider the changes in the interchange code as noted in the editorial on page 780 of the *Railway Age Gazette* of October 25. The amended rules are effective November 1.

A. Smallen, of the claim department of the Chicago, Milwaukee & St. Paul, has been appointed manager of the safety bureau which is being organized on that road. Safety committees are being appointed on all the divisions and in the important yards and shops.

It is announced that beginning January 1, 1913, the Harriman Lines will assume all bond premiums of employees in their service. Hitherto it has been the custom to require all men handling money for the company to furnish a security bond and the premiums have been paid by the employees themselves.

A special train carrying two hundred and fifty Greeks en route from San Francisco to their native country to engage in the Balkan war arrived at Kansas City over the Union Pacific, on October 26. At Kansas City the special was delivered to the Chicago & Alton, which took it to Chicago, where the train was turned over to the Erie.

The United States Express Company has passed its semi-annual dividend of $3 per share, usually paid in November. In making this announcement the company said that its gross revenue from operation in the year ended June 30, 1912, increased by $709,181, while expenses increased $1,149,484, leaving but $233,288 applicable to dividends.

The railways carrying coal from West Virginia to Lake Erie ports have issued orders forbidding the loading of their own cars with coal to points north or west of Toledo. In view of the active demand for bituminous coal in Michigan and Wisconsin, it is expected that this action may tend to increase the price in those states.

The use of the common drinking cup has been prohibited on all interstate railroad trains by a quarantine order issued October 30, by the Secretary of the Treasury. The order was made on the recommendation of Surgeon-General Blue of the Public Health and Marine Hospital service. The order is similar to a law which is in effect in 26 states.

The arbitrators who are considering the question of the wages of locomotive enginemen on the eastern roads, meeting in New York City, have resumed their sittings after a recess of a month. It is not expected that a decision will be issued before the middle of next week, the statistical examinations, which are a part of the board's investigation, being still unfinished.

The postmaster-general has made up his estimates for the next fiscal year, and he calculates that the sum needed to pay the railroads for carrying the mails will be $49,661,000. This is about two millions more than the amount appropriated for the current year; and of this increase of two millions the sum of $1,685,000 is allotted to the parcel post. The total sum estimated as necessary for the parcel post is $7,240,000.

A passenger train of the Missouri, Kansas & Texas was stopped by three robbers near Eufaula, Okla., on Tuesday last and the express car was robbed. To make sure of stopping the train the highwaymen set fire to a trestle bridge; and after stopping the train and having the engine and express car detached, they ordered these run over the bridge through the flames, thus effectually separating themselves from the passenger cars.

The Pennsylvania Railroad has issued a statement to the effect that the number of trespassers killed on the company's lines during the past year was 527; and the expenditures of the police department in its war against trespassing amounted to $100,000. The company again calls on the public—the magistrates, civil authorities, and all public spirited citizens—to aid in the suppression of this widespread evil. A considerable percentage of the trespassers are mischief-makers. They destroy signal lamps, put obstructions on the tracks and commit other acts endangering the safety of trains.

A special train carrying officers of the Toledo, St. Louis & Western on an inspection trip was derailed near Fillmore, Ill., on October 24, while the train was crossing a trestle, causing the death of the negro porter on President Ross' private car, and slightly injuring Thomas H. Hubbard, chairman of the board, who was struck by some baggage. The day coach immediately behind the engine rolled down the embankment, while the two following private cars of President Ross and Chairman Hubbard were still on the trestle. The trestle collapsed, causing the two cars to sag down and hang suspended. The porter was on the platform between the two private cars and was crushed. In addition to Chairman Hubbard the party included President Walter L. Ross, James S. Mackie, vice-president, and F. H. Davis, vice-president, who were only slightly bruised.

The University of Pittsburgh has issued a pamphlet, entitled Bulletin No. 1, giving an outline of the investigation of the smoke nuisance, which is being carried on by the Department of Industrial Research of the university. This investigation, financially provided for by a gift from a Pittsburgh business man, is under the direction of Professor R. K. Duncan, director of the Department of Industrial Research. He has secured the assistance of specialists from other universities and of physicians, architects and other persons specially qualified, in Pittsburgh. Six of these specialists are giving their entire time to the work. It is estimated that the United States, as a whole, suffers a loss of over $500,000,000 yearly in damage to merchandise, defacement of buildings, injury to life, excessive cost of labor, etc., because of imperfect combustion of coal. So far as Pittsburgh is concerned, Professor Duncan intends to determine the amount of this loss as accurately as possible.

The Baltimore & Ohio has just issued the first number of the *Baltimore & Ohio Employee's Magazine,* which is an interesting paper, well illustrated, and containing a variety of material. Among the articles in the first number are "From Stage Coach to Steel Passenger Train," by J. Walter Coon, assistant general manager; "Train Handling," by O. C. Cavins, engineer Ohio division; "Handling the Public," by D. M. Fisher, freight agent. There is a special department devoted to "Safety First," which records the safety records by divisions for the month of July. Another department is devoted to train accidents, describing the causes of the principal accidents which have occurred on the road during the past year, and another shows the results of the observation tests for the preceding month, with detailed record by divisions. Other parts of the paper are devoted to news and personal notes of the various divisions, and to brief articles of interest to the employees and to members of their families.

Representatives of 10 railways witnessed a test of an experimental installation of the Gollos automatic train stop on the Chicago Great Western near De Kalb, Ill., on October 24. A special train was provided to take the party out from Chicago. The cost of the installation and all of the expense incident to the tests have been defrayed by the Gollos Railway Signal Company, proprietors of the device. The tests were successful insofar as the ability of the stop to apply the brakes and bring a train to a standstill was concerned. The Gollos train stop employs a short third rail, a current from which normally holds

closed a local circuit on the engine, keeping the air valve closed. As the shoe on the engine engages the third rail it passes up an incline which causes the local circuit to open; but at the same time a current from the third rail energizes the valve holding-apparatus. In case of an occupied block, or other condition making it unsafe for a train to proceed, the current would have been cut off from the third rail; and the stop apparatus in the engine would act, applying the brakes and shutting off the steam.

Indiana Commission Signal Orders.

The Indiana Railroad Commission reports that the steam roads in that state have now in service, and are installing under the commission's orders, block signaling on lines which represent 42 per cent. of the total mileage. In 1907 when the commission began to urge signaling the steam roads had block signals on about 22 per cent. of their entire mileage in the state.

Following a recent inspection of all the interurban roads in the state the commission has approved installations of automatic blocks on 51 miles, covering installations on three roads; has relieved 17 roads from installing signals; and has ordered to be installed on nine electric lines, by July 1, 1913, 142 miles of automatic block signals.

The Simmen system of despatcher's manual block has been ordered installed on 83 miles of the lines of the Indianapolis & Cincinnati Traction Company.

The commission expects that in less than three years all the steam and interurban mileage in the state which the commission deems necessary to be block signaled, will be so protected.

Earnings of the Steel Corporation.

The report of the United States Steel Corporation for quarter ended September 30, 1912, shows that the total net earnings were $30,063,512 after deducting all expenses incident to operation, including those for ordinary repairs and maintenance of plant, and interest on bonds and fixed charges of subsidiary companies. This compares with $25,102,265 for the last previous quarter and $29,522,725 for the corresponding period in 1911. The monthly net earnings were as follows: July, $9,322,142; August, $10,583,377; September, $10,157,193; the amount available for dividends was $15,093,501. The regular quarterly disbursements of 1¾ per cent. on the preferred and 1¼ common stock were declared at the meeting on October 30. These dividends amount to $12,358,700, leaving a net surplus of $2,434,801 for the quarter.

Brick Arch for Switch Engines.

In the report of a paper on "Elimination of Smoke from Locomotives," which was presented by D. R. MacBain, superintendent of motive power of the Lake Shore & Michigan Southern, before a meeting of the International Association for the Prevention of Smoke at Indianapolis, the statement was made at the top of page 670 in our issue of October 11, 1912, that "on road engines the bricks marked X are not used." This statement refers to Fig. 2, which accompanies the report, and should have read "on switch engines the bricks marked X are omitted and on road engines only the five rows of brick near the front end of the firebox are used."

Grade Crossings in New York City.

The New York Public Service Commission, First district, has asked for an appropriation for the year 1913 of $1,500,000 to be used in the elimination of grade crossings on the railroads within the limits of Greater New York. As only one-quarter of the cost of such work is paid by the state, this means a total of $6,000,000.

Elimination work to cost about $2,000,000 is now under way at Flushing, on the Long Island Railroad. Additional elimination work to cost $1,400,000 would now be in progress had it not been for the veto by Governor Dix of the appropriation of $350,000 made by the last legislature. The commission had conducted the proceedings necessary under the law and everything was ready to begin work when the governor's veto halted further action.

The total number of crossings, both public and private, within the city is 488, of which 205 are in Queens, 117 in Richmond, 103 in Manhattan, 58 in Brooklyn, and 5 in the Bronx. With the elimination work already ordered by the commission, and that going on as a result of agreements between the city and railroad companies, this total will be reduced by 48, of which 32 are in Queens, 10 in Brooklyn, 4 in the Bronx, and 2 in Richmond.

A Reform in Dining Cars.

No more hungry passengers
  Standing on their feet,
Examining minutely
  Every bite you eat.
No reproachful glances
  From eyes at least a score—
If you should call your waiter
  And order something more.
No more week-end trippers
  Weakening at the knees,
While in ease and comfort
  Your hunger you appease;
No more famished drummers
  Blocking up the aisles
While with the nuts you're toying
  For miles, and miles, and miles.

Now some of you may wonder
  Where all these people are—
They're really snugly seated
  Back in the Pullman car,
Through the windows gazing—
  With happiness aglow—
At sunny California's
  Moving picture show,
And each one holds a coupon
  Calling for a seat,
When someone in the diner
  Has had enough to eat!

The silver brightly glimmers,
  The spotless linen gleams,
The glassware shines and shimmers,
  Your waiter smiles and beams—
For everything is lovely
  And naught your pleasure mars
When eating dinner a la carte
  On S. P. dining cars.

—*R. F. Wilson, in San Francisco Examiner.*

Partial Opening of the Grand Central Terminal, New York.

The suburban or lower level "concourse" of the Grand Central Terminal, Forty-second street and Fourth avenue, New York City, was opened for business on Sunday morning last, and passengers to and from a part of the suburban trains may now abandon the temporary waiting room and platforms on the east side of the station which have served during the past few years while the new station was under construction. The newly opened room is 300 ft. long and 120 ft. wide and adjacent to it are a baggage room, a telegraph office, telephone booths, a parcel room, newsstand, information bureau and all the facilities of a complete station, including a restaurant, though this is not yet finished. As one enters the concourse from the street he finds ten ticket windows of the New York, New Haven & Hartford on his right, and ten of the New York Central & Hudson River on his left. Five of the gateways leading to the train platforms have been put in use, each gate affording access to two tracks. For the present the lower level tracks are used only by trains to and from Stamford on the New Haven road and Peekskill on the Hudson division of the New York Central, and those running to or from termini short of those towns.

The concourse is finished in Botticino marble which is the color of a cup of cocoa; and the room has a terrazza floor. This room is dependent wholly on artificial light; and the heating and ventilation both are managed mainly by means of ornamental grated openings in the square enclosures, 4 ft. x 4 ft., surrounding the steel columns which support the floors above.

The indicators posted at the sides of the gateways leading to the trains show the number of the track, the name and the leaving time of the train and the names of the principal stations at

which the train stops. These indicators consist of large solid black frames in which is a black curtain, bearing the wording in white letters; a very simple and attractive arrangement.

The concourse is about 150 ft. back from Forty-second street and its floor is about 26 ft. below the level of the sidewalk. It is reached by inclined planes or ramps, and another ramp leads from the concourse to the platforms adjacent to the lower level tracks which are 14 ft. farther down, or about 40 ft. below the level of the street. The grade of the ramps is about 10 per cent.

The passenger's interest in the ramps has to do mainly, of course, with the ascending journey. One alighting from an incoming train on the lower level finds himself about 700 ft. from the street, measuring from the exit gate by the path which he is to travel, which is from the northeast to the southwest corner of the station. But the ramps are not continuous and the passenger finds his one-furlong journey broken by four level stretches varying from 10 ft. to about 150 ft. in length; and it is made very comfortably. He turns four corners. (When all of the tracks are in use, some of these up-hill journeys will be shorter.) For rolling chairs, which are used for invalids, the route is an easy one, broken by no thresholds. The upward track, measured roughly in paces (yards), is composed as follows: level to the foot of the first ramp, 30 paces; first ramp, rising about 14 ft., 45 paces; then across about half the concourse, level, 50 paces; then up 9 paces; level, 3; up, 27; level, 6; up, 12; level, 8; and finally up 33 paces; this last ramp lifting the passenger about 12 ft. He is then about 10 paces from the exit to the street. The aggregate length of the five ramps is about 380 ft. Adding the level portions the average grade, from the train platform to the street, is about 6 per cent.

Passengers going to the Interborough subway do not have to ascend the final ramp, but go directly from the last preceding level into the mezzanine floor of the subway station, beneath Forty-second street. The floors of the ramps are laid with rough brick, the faces of which are about 6 in. square. The location of the last or uppermost ramp is shown in one of the illustrations published in the *Railway Age Gazette*, September 16, 1910.

The complete opening of the new station is expected to take place in January next.

The American Iron and Steel Institute.

The third annual meeting of the American Iron and Steel Institute was held at the Hotel Schenley, Pittsburgh, Pa., October 25. In his opening address, the president of the institute, E. H. Gary, chairman of the United States Steel Corporation, said in part: "We are in the midst of an era of prosperity never before surpassed so far as it affects our particular line. These conditions have not resulted from the application of political policies or efforts, but exists in spite of them. They are here because nothing could prevent." Mr. Gary then went on to say how, in consequence of the feeling of uncertainty and the lack of confidence on the part of the great purchasing public since the panic of 1907, the necessities of the consumers had piled up to such an extent that they had lately been forced to increase their purchases materially. "Moreover, the bountiful crops and sound basic condition of the country have made every one realize more clearly than ever before that prosperity in this splendid country of ours is to be the rule and not the exception, notwithstanding that at times we may be surrounded by adverse influences and unwarrantable interference, which, in any ordinary country, would bring prolonged distress and suffering." Mr. Gary then said that the people of the country now face innumerable problems, and that there was no way of permanently settling any great question involving the welfare of humankind except on the basis of right and justice.

John L. Haines, of the Jones & Laughlin Steel Company, read a paper entitled "The Buyer from a Manufacturer's Standpoint," and J. M. Camp, of the Carnegie Steel Company, told about the school recently established by that company for the training of salesmen along practical lines. This school is designed to show the salesmen how iron and steel and their products are made; to familiarize them with the materials they sell; to show them wherein their products excel that of their competitors, and to furnish them convincing arguments that such is the case.

American Railway Association.

At the fall session of the American Railway Association which will be held at The Blackstone, Chicago, November 20, reports will be presented by the following committees: Executive committee; committee on transportation; committee on maintenance; committee on relations between railroads; committee on the safe transportation of explosives and other dangerous articles; committee on electrical working, and committee on nominations. Three members of the committee on the safe transportation of explosives and other dangerous articles, three members of the committee on electrical working and two members of the committee on nominations will be elected at this meeting.

Association of Freight Traffic Officers.

The annual meeting of the American Association of Freight Traffic Officers will be held at the LaSalle Hotel, Chicago, on November 15 and 16. The program has not yet been completely arranged, but it includes a business meeting on the morning of November 15, and an automobile inspection of the transportation facilities in the downtown section of the city for members in the afternoon, while the ladies will be taken on an automobile ride through the parks and boulevards. The annual dinner will be held in the evening. The second day has been reserved as a visiting day, and will also include an adjourned session of the business meeting if necessary.

Central Railway Club.

At the next regular meeting of the Central Railway Club, to be held at the Hotel Statler, Buffalo, N. Y., on November 8, John P. Kelly, consulting air brake engineer, will present a paper on Wheel Sliding on Heavy Passenger Equipment.

American Society of Mechanical Engineers.

At the meeting of the American Society of Mechanical Engineers to be held in New York, November 12, Edward B. Passano, of Baltimore, Md., will present a paper entitled Measuring Efficiency in Manufacturing.

New York Railroad Club.

The annual meeting of the New York Railroad Club will be held on November 15. Gilbert E. Ryder, of New York, will present a paper on The Locomotive Superheater and Some of Its Effects on the Cost of Railway Operation.

MEETINGS AND CONVENTIONS.

The following list gives names of secretaries, dates of next or regular meetings, and places of meeting.

AIR BRAKE ASSOCIATION.—F. M. Nellis, 53 State St., Boston, Mass. Convention, May 6-9, St. Louis, Mo.

AMERICAN ASSOCIATION OF DEMURRAGE OFFICERS.—A. G. Thomason, Boston, Mass.

AMERICAN ASSOCIATION OF GENERAL PASSENGER AND TICKET AGENTS.—W. C. Hope, New York.

AMERICAN ASSOCIATION OF FREIGHT AGENTS.—R. O. Wells, East St. Louis, Ill.

AMERICAN ASSOCIATION OF RAILROAD SUPERINTENDENTS.—E. H. Harman, St. Louis, Mo.; 3d Friday of March and September.

AMERICAN ELECTRIC RAILWAY ASSOCIATION.—H. C. Donecker, 29 W. 39th St., New York.

AMERICAN ELECTRICAL RAILWAY MANUFACTURERS' ASSOC.—George Keegan, 165 Broadway, New York. Meetings with Am. Elec. Ry. Assoc.

AMERICAN RAILWAY ASSOCIATION.—W. F. Allen, 75 Church St., New York; semi-annual, November 20, 1912, Chicago.

AMERICAN RAILWAY BRIDGE AND BUILDING ASSOCIATION.—C. A. Lichty, C. & N. W., Chicago. Convention, 3d week in Oct., Baltimore, Md.

AMERICAN RAILWAY ENGINEERING ASSOCIATION.—E. H. Fritch, 900 S. Michigan Ave., Chicago. Convention, March 18-20, 1913, Chicago.

AMERICAN RAILWAY MASTER MECHANICS' ASSOCIATION.—J. W. Taylor, Old Colony building, Chicago.

AMERICAN RAILWAY TOOL FOREMEN'S ASSOCIATION.—M. H. Bray, N. Y. N. H. & H., New Haven, Conn.

AMERICAN SOCIETY FOR TESTING MATERIALS.—Prof. E. Marburg, University of Pennsylvania, Philadelphia, Pa.; annual, June, 1913.

AMERICAN SOCIETY OF CIVIL ENGINEERS.—C. W. Hunt, 220 W. 57th St., New York; 1st and 3d Wed., except June and August, New York.

AMERICAN SOCIETY OF ENGINEERING CONTRACTORS.—J. R. Wemlinger, 13 Park Row, New York; 2d Tuesday of each month, New York.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS.—Calvin W. Rice, 29 W. 39th St., New York.

AMERICAN WOOD PRESERVERS' ASSOCIATION.—F. J. Angier, B. & O., Baltimore, Md. Convention, 3d week in January, 1913, Chicago.

ASSOCIATION OF AMERICAN RAILWAY ACCOUNTING OFFICERS.—C. G. Phillips, 143 Dearborn St., Chicago.

ASSOCIATION OF RAILWAY CLAIM AGENTS.—J. R. McSherry, C. & E. I., Chicago.

ASSOCIATION OF RAILWAY ELECTRICAL ENGINEERS.—Jos. A. Andreucetti, C. & N. W. Ry., Chicago.

ASSOCIATION OF RAILWAY TELEGRAPH SUPERINTENDENTS.—P. W. Drew, 112 West Adams St., Chicago; annual, May 20, 1913, St. Louis, Mo.

ASSOCIATION OF TRANSPORTATION AND CAR ACCOUNTING OFFICERS.—G. P. Conard, 75 Church St., New York. Meeting Dec. 10-11, 1912, New Orleans, La.

CANADIAN RAILWAY CLUB.—James Powell, Grand Trunk Ry., Montreal, Que.; 2d Tuesday in month, except June, July and Aug., Montreal.

CANADIAN SOCIETY OF CIVIL ENGINEERS.—Clement H. McLeod, 413 Dorchester St., Montreal, Que.; Thursdays, Montreal.

CAR FOREMEN'S ASSOCIATION OF CHICAGO.—Aaron Kline, 841 North 50th Court, Chicago; 2d Monday in month, Chicago.

CENTRAL RAILWAY CLUB.—H. D. Vought, 95 Liberty St., New York; 2d Thurs. in Jan. and 2d Fri. in March, May, Sept., Nov., Buffalo, N. Y.

CIVIL ENGINEERS' SOCIETY OF ST. PAUL.—L. S. Pomeroy, Old State Capitol building, St. Paul, Minn.; 2d Monday, except June, July, August and September, St. Paul.

ENGINEERS' SOCIETY OF PENNSYLVANIA.—E. R. Dasher, Box 704, Harrisburg, Pa.; 1st Monday after 2d Saturday, Harrisburg, Pa.

ENGINEERS' SOCIETY OF WESTERN PENNSYLVANIA.—E. K. Hiles, 803 Fulton building, Pittsburgh; 1st and 3d Tuesday, Pittsburgh, Pa.

FREIGHT CLAIM ASSOCIATION.—Warren P. Taylor, Richmond, Va.

GENERAL SUPERINTENDENTS' ASSOCIATION OF CHICAGO.—E. S. Koller, 226 W. Adams St., Chicago; Wed. preceding 3d Thurs., Chicago.

INTERNATIONAL RAILWAY CONGRESS.—Executive Committee, 11, rue de Louvain, Brussels, Belgium. Convention, 1915, Berlin.

INTERNATIONAL RAILWAY FUEL ASSOCIATION.—C. G. Hall, 922 McCormick building, Chicago.

INTERNATIONAL RAILWAY GENERAL FOREMEN'S ASSOCIATION.—L. H. Bryan, Brown Marx building, Birmingham, Ala.

INTERNATIONAL RAILROAD MASTER BLACKSMITHS' ASSOCIATION.—A. L. Woodworth, Lima, Ohio.

MAINTENANCE OF WAY MASTER PAINTERS' ASSOCIATION OF THE UNITED STATES AND CANADA.—W. G. Wilson, Lehigh Valley, Easton, Pa. Convention, November 19-21, Chicago.

MASTER BOILER MAKERS' ASSOCIATION.—Harry D. Vought, 95 Liberty St., New York. Convention, May 26-29, 1913, Chicago.

MASTER CAR BUILDERS' ASSOCIATION.—J. W. Taylor, Old Colony building, Chicago.

MASTER CAR AND LOCOMOTIVE PAINTERS' ASSOC. OF U. S. AND CANADA.—A. P. Dane, B. & M., Reading, Mass.

NATIONAL RAILWAY APPLIANCES ASSOC.—Bruce V. Crandall, 537 So. Dearborn St., Chicago. Meetings with Am. Ry. Eng. Assoc.

NEW ENGLAND RAILROAD CLUB.—G. H. Frazier, 10 Oliver St., Boston, Mass.; 2d Tuesday in month, except June, July, Aug. and Sept., Boston.

NEW YORK RAILROAD CLUB.—H. D. Vought, 95 Liberty St., New York; 3d Friday in month, except June, July and August, New York.

NORTHERN RAILROAD CLUB.—C. L. Kennedy, C. M. & St. P., Duluth, Minn.; 4th Saturday, Duluth.

PEORIA ASSOCIATION OF RAILROAD OFFICERS.—M. W. Rotchford, Union Station, Peoria, Ill.; 2d Tuesday.

RAILROAD CLUB OF KANSAS CITY.—C. Manlove, 1008 Walnut St., Kansas City, Mo.; 3d Friday in month, Kansas City.

RAILWAY BUSINESS ASSOCIATION.—Frank W. Noxon, 2 Rector St., New York; annual, November 19, 1912, New York.

RAILWAY CLUB OF PITTSBURGH.—J. B. Anderson, Penna. R. R., Pittsburgh, Pa.; 4th Friday in month, except June, July and August, Pittsburgh.

RAILWAY ELECTRICAL SUPPLY MAUNFACTURERS' ASSOC.—J. Scribner, 1021 Monadnock Block, Chicago. Meetings with Assoc. Ry. Elec. Engrs.

RAILWAY GARDENING ASSOCIATION.—J. S. Butterfield, Lee's Summit, Mo.

RAILWAY DEVELOPMENT ASSOCIATION.—W. Nicholson, Kansas City Southern, Kansas City, Mo. Next meeting, Nov. 17, 1912, Cincinnati, Ohio.

RAILWAY SIGNAL ASSOCIATION.—C. C. Rosenberg, Bethlehem, Pa.

RAILWAY STOREKEEPERS' ASSOCIATION.—J. P. Murphy, Box C, Collinwood, Ohio.

RAILWAY SUPPLY MANUFACTURERS' ASSOC.—J. D. Conway, 2135 Oliver bldg., Pittsburgh, Pa. Meetings with M. M. and M. C. B. Assocs.

RAILWAY TEL. AND TEL. APPLIANCE ASSOC.—W. E. Harkness, 284 Pearl St., New York. Meetings with Assoc. of Ry. Teleg. Sups.

RICHMOND RAILROAD CLUB.—F. O. Robinson, Richmond, Va.; 2d Monday, except June, July and August.

ROADMASTERS' AND MAINTENANCE OF WAY ASSOCIATION.—L. C. Ryan, C. & N. W., Sterling, Ill.

ST. LOUIS RAILWAY CLUB.—B. W. Frauenthal, Union Station, St. Louis, Mo.; 2d Friday in month, except June, July and Aug., St. Louis.

SIGNAL APPLIANCE ASSOCIATION.—F. W. Edmonds, 3868 Park Ave., New York. Meetings with annual convention Railway Signal Association.

SOCIETY OF RAILWAY FINANCIAL OFFICERS.—C. Nyquist, La Salle St. Station, Chicago.

SOUTHERN ASSOCIATION OF CAR SERVICE OFFICERS.—E. W. Sandwich, A. & W. P. Ry., Montgomery, Ala.

SOUTHERN & SOUTHWESTERN RAILWAY CLUB.—A. J. Merrill, Grant bldg., Atlanta, Ga.; 3d Thurs., Jan., March, May, July, Sept., Nov., Atlanta.

TOLEDO TRANSPORTATION CLUB.—J. G. Macomber, Woolson Spice Co., Toledo, Ohio; 1st Saturday, Toledo.

TRAFFIC CLUB OF CHICAGO.—Guy S. McCabe, La Salle Hotel, Chicago; meetings monthly, Chicago.

TRAFFIC CLUB OF NEW YORK.—C. A. Swope, 290 Broadway, New York; last Tuesday in month, except June, July and August, New York.

TRAFFIC CLUB OF PITTSBURGH.—D. L. Wells, Erie, Pittsburgh, Pa.; meetings monthly, Pittsburgh.

TRAFFIC CLUB OF ST. LOUIS.—A. F. Versen, Mercantile Library building, St. Louis, Mo. Annual meeting in November. Noonday meetings October to May.

TRAIN DESPATCHERS' ASSOCIATION OF AMERICA.—J. F. Mackie, 7042 Stewart Ave., Chicago.

TRANSPORTATION CLUB OF BUFFALO.—J. M. Sells, Buffalo; first Saturday after first Wednesday.

TRANSPORTATION CLUB OF DETROIT.—W. R. Hurley, L. S. & M. S., Detroit, Mich.; meetings monthly.

TRAVELING ENGINEERS' ASSOCIATION.—W. O. Thompson, N. Y. C. & H. R., East Buffalo, N. Y.

UTAH SOCIETY OF ENGINEERS.—R. B. Ketchum, University of Utah, Salt Lake City, Utah; 3d Friday of each month, except July and August.

WESTERN CANADA RAILWAY CLUB.—W. H. Rosevear, P. O. Box 1707, Winnipeg, Man.; 2d Monday, except June, July and August, Winnipeg.

WESTERN RAILWAY CLUB.—J. W. Taylor, Old Colony building, Chicago; 3d Tuesday of each month, except June, July and August.

WESTERN SOCIETY OF ENGINEERS.—J. H. Warder, 1735 Monadnock Block, Chicago; 1st Monday in month, except July and August, Chicago.

Traffic News.

The Western Maryland and the Pittsburgh & Lake Erie have put on through passenger trains between Baltimore and Pittsburgh, the first passenger service over the new Pittsburgh extension of the W. M.

The Santa Fe de luxe train which was put in service between Chicago and California last winter, running once a week on a 63-hour schedule, will resume its service this year, leaving Chicago for its first trip on December 10. An extra fare of $25 is charged.

The Railway Ticket Protective Bureau reports that David Lyons, one of the two remaining ticket brokers having offices in Chicago, has been fined $150 in the Federal court for selling a pass which had been issued by the Chicago, Burlington & Quincy to a telegraph operator newly employed by that road.

The through night train between Boston and Washington, which formerly went by the "Steamer Maryland Route" across New York harbor, now runs over the Poughkeepsie bridge and the Lehigh & Hudson River road. The Lehigh & Hudson River connects the New Haven road (Central New England) at Maybrook, N. Y., with the Pennsylvania at Belvidere, N. J., 73 miles southwest of Maybrook.

Mr. Donahue, a traffic inspector for the State Public Service Commission, estimates that the number of car floats and freight lighters in use in New York harbor is 11,000, of which 1,000 have steam power. About 1,500 cars (on floats) are delivered to docks in the southern part of Manhattan every working day. Freight is taken out of these cars and other freight put in while the cars stand on the floats, adjacent to the docks.

The Agricultural Department has been making experiments in Arizona, California and Colorado to see what could be done in the production of rosin and turpentine in those states. Western yellow pine does not yield so much as the southern yellow pine, and the season of flow is shorter in the western states, but it is believed that satisfactory results may be obtained. The experiments are described in Forest Service bulletin No. 111.

The Department of Agriculture has issued a pamphlet entitled "Railroads and Farming," which sets forth what the railroads of the country have done in the way of instructing farmers, finding markets for farm produce and making investigations of soils and other things. The pamphlet tells of things that the railways did for the farmers as far back as 1880. A list of the companies now actively engaged in the promotion of agricultural knowledge is given.

As has been noted in these columns, the railroads are not the only friends of the farmers. The General Education Board, which dispenses funds provided by John D. Rockefeller, announces that assistance is to be given to agricultural demonstrations in the northern states, large sums having already been spent for this purpose in the southern states. Appropriations have been made for St. Lawrence county, New York, and for four counties in Maine, to be used under the direction of agricultural colleges and schools.

It is announced that the average car loading on the lines of the Southern Pacific in California this fall has been greater, by 6,200 cars a month, or about 200 cars a day, than during the corresponding period of last year. The fruit shippers are cooperating with the railways in an effort to secure the maximum efficiency of the car equipment, and large fruit firms have instructed their agents not to delay or divert shipments unnecessarily. The Pacific Fruit Express has ordered 2,000 refrigerator cars designed especially for the fruit business, which, together with a lot of 1,000 recently ordered, will bring the total equipment of this line up to 13,100 cars.

New freight tariffs issued by the Southern Pacific, by applying main line rates on carload lumber shipments from certain points on branch lines in Oregon, have materially reduced rates into Denver, Omaha and St. Louis and Chicago territories. Some of the changes have already gone into effect; the others will be effective November 4. They apply from points on the Portland

Railway & Navigation Company, the Salem, Falls City & Western, the Corvallis & Eastern Railroad and the Mohawk branch of the Southern Pacific. The new rate to Denver is $8; to Omaha, $10; and to St. Louis and Chicago, $11, replacing the following rates: from Falls City, Ore., to Denver, $8.54; to Omaha, $10.54; to St. Louis and Chicago, $11.54; from Black Rock and Summit, Ore., to Denver, $8.60; to Omaha, $10.60; to St. Louis and Chicago, $11.60; from Yaquina, Ore., to Denver, $8.70; to Omaha, $10.70; to St. Louis and Chicago, $11.70; from Detroit, Ore., to Denver, $8.50; to Omaha, $10.50; to St. Louis and Chicago, $11.50; from Yarnell and Wendling, Ore., to Denver, $8.25; to Omaha, $10.25; to St. Louis and Chicago, $11.25.

Summary of Revenues and Expenses of Steam Roads in August.

The Bureau of Railway Economics' summary of revenues and expenses and comments thereon for August, 1912, are as follows: The railways whose returns are included in bulletin No. 40 operate 220,405 miles of line, or 90 per cent. of all the steam railway mileage in the United States. The total operating revenues for the month of August, 1912, amounted to $268,373,157. This includes revenues from freight and passenger traffic, from carrying mail and express, and from miscellaneous sources. Compared with August, 1911, the total operating revenues of these railways show an increase of $24,792,631. These total operating revenues per mile of line amounted to $1,218 in August, 1912, and $1,122 in August, 1911, an increase for 1912 of $96, or 8.6 per cent. This increase was the resultant of increases in each revenue account, as follows: freight revenue, 10.7 per cent.; passenger revenue, 3.8 per cent.; other transportation revenue, 5.9 per cent.; non-transportation revenue, 16.5 per cent.

Operating expenses, which include all the costs of maintaining track and equipment, operating trains, securing traffic, and of administration, amounted in August to $171,970,185. This was $13,865,622 more than for August, 1911. These operating expenses per mile of line amounted to $780 in August, 1912, and $728 in August, 1911, an increase for 1912 of $52 per mile, or 7.2 per cent. Four of the five primary operating expense accounts showed increases in 1912. In the cost per mile of maintaining way and structures, i. e., track and buildings, there was an increase compared with August, 1911, of 5.8 per cent.; in the cost per mile of maintaining equipment an increase of 11.0 per cent.; in transportation expenses per mile an increase of 6.9 per cent.; and in general expense per mile an increase of 1.8 per cent. Traffic expenses per mile decreased 2.2 per cent. from August, 1911.

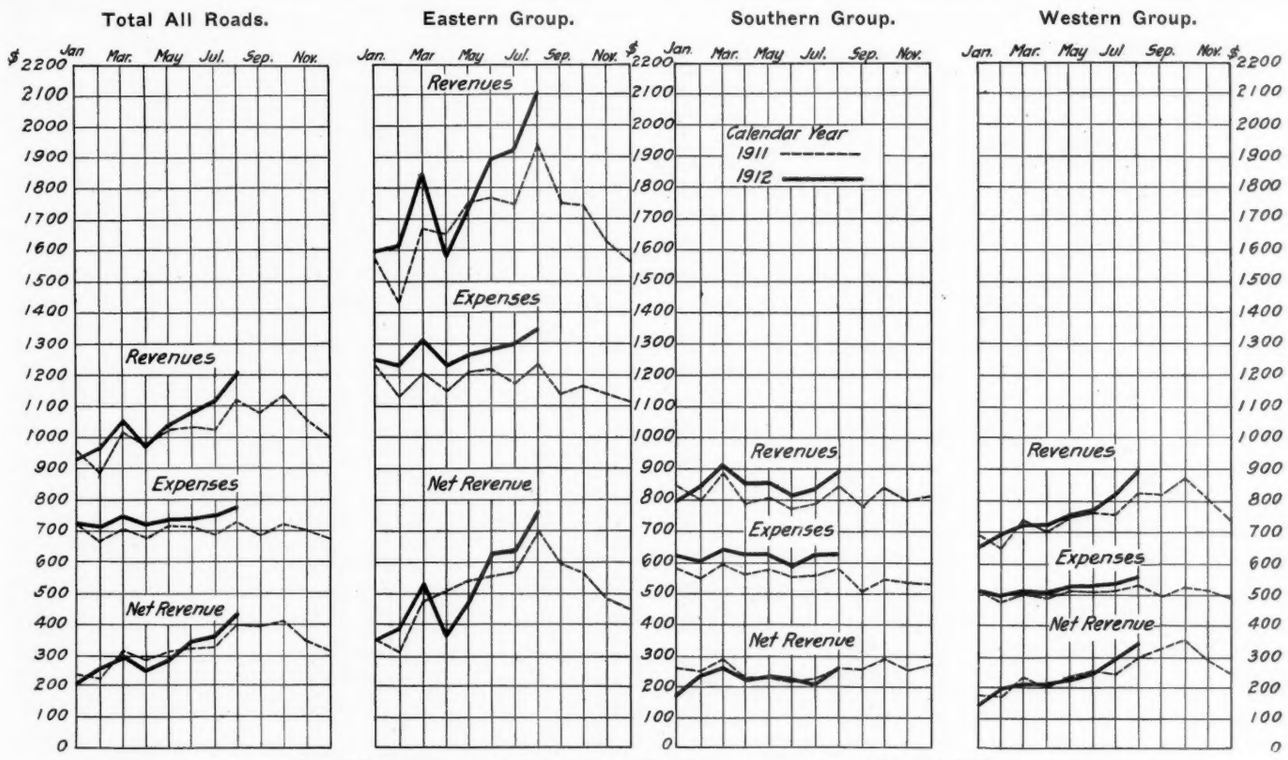
Net operating revenue, that is, total operating revenues less operating expenses, amounted in August to $96,402,972. This was $10,927,009 more than for August, 1911. Net operating revenue per mile of line amounted to $437 in August, 1912, and $394 in August, 1911, an increase for 1912 of $44 per mile, or 11.1 per cent. The net operating revenue for each mile of line for each day in August, 1912, averaged $14, and for August, 1911, $13. It should be recalled that net operating revenue represents gross income before anything has been taken out for taxes, rentals, interest on bonds, appropriations for betterments or dividends.

Taxes for the month of August amounted to $9,977,903, or $45 per mile, an increase of 6.8 per cent. over August, 1911.

The operating ratio for August, that is, the per cent. of total operating revenues which was absorbed in operating expenses, was 64.1 per cent., which is comparable with 67.4 per cent. in July, 1912, and 64.9 per cent. in August, 1911.

The eastern group of railways shows an increase in total operating revenues per mile of line as compared with August, 1911, of 9.4 per cent., the southern group an increase of 5.6 per cent., and the western group an increase of 8.7 per cent. Operating expenses per mile increased 9.2 per cent. on the eastern railways as compared with August, 1911, 8.2 per cent. on the southern railways, and 4.6 per cent. on the western railways. For the eastern group of railways net operating revenue per mile increased 9.9 per cent. as compared with August, 1911, for the western group it increased 16.1 per cent., while for the southern group it decreased 0.2 per cent. The increase in taxes per mile, compared with August, 1911, was 5.0 per cent. in the eastern group, 4.9 per cent. in the southern group, and 9.2 per cent. in the western group.

Comparison of the returns for the two months of the fiscal year with those of the corresponding months of the previous fiscal year reveals an increase in total operating revenues per mile of 8.6 per cent., an increase in operating expenses per mile of 7.4 per cent., and an increase in net operating revenue per mile of 11.0 per cent. This net operating revenue per mile of the eastern group of railways increased 10.3 per cent. as compared with the corresponding period of the previous fiscal year,



Monthly Revenues and Expenses Per Mile of Line in 1911 and 1912.

that of the western group increased 16.2 per cent., while that of the southern group decreased 2.7 per cent.

When the returns for the eight months of the calendar year 1912 are compared with those of the corresponding months of 1911, they show an increase in total operating revenues per mile of 4.0 per cent., an increase in operating expenses per mile of 5.2 per cent., and an increase in net operating revenue per mile of 1.4 per cent. There was an increase in net operating revenue per mile of 3.1 per cent. in the eastern group, an increase of 3.0 per cent. in the western group, and a decrease of 6.8 per cent. in the southern group.

The diagram shows the variations in total operating revenues, operating expenses, and net operating revenue per mile for the separate months of the calendar year 1911 and of the calendar year 1912 to date. The following table shows the per cent. of operating revenues consumed by each class of expenses.

PER CENT. OF TOTAL OPERATING REVENUES.

	August,		Fiscal year ended June 30,		Calendar year ended December 31,	
	1912.	1911.	1912.	1911.	1912.	1911.
Maint. of way and structures.....	13.4	13.7	12.7	12.9	12.7	13.3
Maint. of equipment.....	15.4	15.0	15.8	15.5	15.5	15.3
Traffic expenses	1.8	2.1	2.2	2.2	2.1	2.1
Transportation expenses	31.4	31.9	35.9	35.5	35.4	34.7
General expenses	2.1	2.2	2.5	2.5	2.6	2.4
Total operating expenses.....	64.1	64.9	69.1	68.6	68.3	67.8

Traffic Club of New York.

At the regular monthly meeting of the Traffic Club of New York, held at the Waldorf-Astoria, October 29, Dr. Irving W. Fay, of the Brooklyn Polytechnic Institute, delivered an address on Recent Discoveries in the Chemical Industry.

Southern Classification.

At the conclusion of the conference on August 26-29, between representatives of the railroad commissions of the southern states, representatives of the various southern railroads, and the Interstate Commerce Commission, the following stipulation was made by the representatives of the carriers. If, upon final examination of Southern Classification No. 39, the Interstate Commerce Commission should be of the opinion that certain items to which objection had been taken should be suspended, the Southern Classification Committee would withdraw such items for the present, put them on its public docket and give them further consideration, thus permitting all other parts of the new classification to become effective October 1.

Subsequently, the effective date of Southern Classification No. 39 was postponed to November 1, in order that the carriers might make the changes specified by the commission in pursuance to the above stipulation. In the meantime the carriers have recast the classification according to the suggestions of this commission, withdrawing the objectionable items and filing the balance of the classification to take effect November 1.

Broadly speaking, the recommendations of the commission were as follows:

That the present agricultural implement list be continued to the extent necessary to maintain existing privileges with respect to mixed carloads, and to continue the present ratings on the articles in that list; that the present machinery list be continued to such extent as may be necessary to maintain existing privileges as to mixed carloads; that certain rules, or parts of rules, be withdrawn pending decision by the commission in the Western Classification case; that certain specific advances be withdrawn.

The commission did not request withdrawal of advances in minimum weights where it seemed clear that the proposed minimum weight could be loaded in a standard car; nor did the commission recommend withdrawal of new items which maintained existing rates on an article when shipped in a secure package but provided for higher rates when shipped loose or in a package which might subject the article to danger in transit.

The above action by the commission with respect to Southern Classification No. 39 does not indicate any final determination as to the propriety of the items which have been permitted to become effective, and all such items are subject to complaint in the usual manner.

INTERSTATE COMMERCE COMMISSION.

The commission has suspended from November 15 until February 12 items which advance rates for the transportation of excelsior, in carloads, from St. Paul, Minn., and other points, to Kansas City, Mo., and other points.

The commission has denied the petition of the Central of New Jersey and other roads to reopen the case of the Marion Coal Company in which the commission ordered a reduction in freight rates on prepared sizes of coal to New York harbor.

The commission has further suspended from October 31 until April 30 the tariff which advances rates for the transportation of cypress lumber, laths, and shingles from points located on the New Orleans, Texas & Mexico to Albany, N. Y., and other points.

The State Railroad Commissioners of Iowa have presented to the Interstate Commerce Commission an elaborate complaint alleging unfair freight rates from points in Iowa to states west of there, and also from Indiana and points east thereof to points in Iowa. It is charged that the rates as now made by the railroads give a decided advantage to St. Louis and to Kansas City.

The five oil pipe lines which have been ordered to file tariffs as interstate common carriers have this week argued before the Commerce Court their appeal from the Interstate Commerce Commission. The Interstate Commerce Commission has postponed to December 1, the date on which its order shall become effective; and it is expected that before that time the Commerce Court may hand down its decision.

The commission has suspended from November 1 until February 12, items which establish new rules with relation to the preparation of cars for shipments of potatoes from points in Minnesota and Wisconsin to points west of the Mississippi river and between other points. The rule which has been suspended provides, in substance, that the carriers will not accept shipments of potatoes between November 1 and April 15 (except when in their judgment weather conditions permit) unless the shipper at his own expense lines the car, puts in a false floor, furnishes a stove and fuel for heating the car and an attendant to accompany the shipment.

The commission has suspended from October 26, until February 8, the item in supplement 60 to the tariff of the Chicago, Rock Island & Pacific, which cancels an existing proportional commodity rate on starch of 11 cents per 100 lbs., minimum weight 30,000 lbs., from Boone, Ia., and Cedar Rapids, to Atchison, Kan., and Leavenworth, Kansas City, Mo., Sugar Creek and St. Joseph (when for points beyond) and announces that class rates will apply. The proposed cancellation would result in an advance of 2 cents per 100 lbs. in the rate and an advance in the minimum weight of from 30,000 lbs. to 36,000 lbs. A similar tariff by the Chicago, Milwaukee & St. Paul, effective October 12, was suspended by order in the same docket under date of October 9.

Proposed Increases in Rate on Barley Discriminatory.

In re investigation and suspension of advances in rates by carriers for the transportation of barley (whole) in carloads from points in California, Nevada and Utah to Minneapolis, Minn., and other points. Opinion by Commissioner Clark:

The present rate on barley from California points to Minneapolis, Minn., is 55 cents per 100 lbs.; from California points to Chicago via Omaha, 62½ cents per 100 lbs.; and from Minneapolis to Chicago via Duluth, 7½ cents per 100 lbs. The proposed advance which has been suspended would increase the rate from California points to Minneapolis from 55 cents to 58 cents per 100 lbs. No change in the other rates is proposed. If the proposed increase were permitted it would stop the practice of malting at Minneapolis and then shipping on to Chicago, which is now done at the same rate as is paid for transportation to Chicago direct. The commission found that the proposed advance was not shown to be reasonable or to be free from unjust discrimination against Minneapolis to the undue advantage of Chicago, and ruled that the present arrangement of rates on barley from California via Omaha, 7½ cents less to Minneapolis than to Chicago, should be continued. (24 I. C. C., 664.)

Transit Privileges on Forest Products.

In re investigation and suspension of advances in rates by carriers for the transportation of logs and bolts into Nashville, Tenn., and other milling points located on the Louisville & Nashville. Opinion by Commissioner Clark:

By mistake the Louisville & Nashville issued a tariff providing that for each pound of rough lumber shipped out of Nashville, Tenn., transit rates would be applied to two pounds of inbound logs. Previously transit rates had been allowed on three pounds of inbound logs for each pound of rough lumber outbound. The Louisville & Nashville is now willing to change the tariff in question so that it will provide for transit rates on three pounds of logs shipped in for each pound of dried lumber, dressed or rough, shipped out, and also to make the limit of the transit privilege 12 months. This is satisfactory to the protestants and the order of suspension will be vacated when the supplement making these changes has been filed. (24 I. C. C., 683.)

Lemon Rates Reduced.

Arlington Heights Fruit Exchange et al v. Southern Pacific et al. Opinion by Commissioner Clark:

For several years prior to December 9, 1911, the defendant's rates on lemons in carloads from points in California to points in Oregon, Washington and Idaho were made of combinations of local rates with the provision that in no case should the total rate exceed $1 per 100 lbs. On December 9, 1911, the defendant issued a supplement providing that the combination rates would apply except where they exceeded $1.15 per 100 lbs., in which case the total through charge would be $1.15 per 100 lbs. The complainant contends that the present rates are unreasonable to the extent that they exceed $1 per 100 lbs. The commission found that the advance in the rate was not justified by the defendants and ordered that for the future the rates should not exceed $1 per 100 lbs. Reparation was awarded. (24 I. C. C., 671.)

Complaint Dismissed.

F. E. Moore v. Denver & Rio Grande. Opinion by the commission:

The commission found that rates of $2.23 and $2.24½ for the transportation of furniture in carloads from Burlington, Iowa, to Hotchkiss, Col., were neither unreasonable nor unduly discriminatory. (25 I. C. C., 1.)

Eagle Pass Lumber Company v. National Railways of Mexico, et al. Opinion by the commission:

The commission found that the American carrier was not responsible for the matters complained of and that as foreign carriers are not subject to the jurisdiction of the act to regulate commerce no relief could be granted. (25 I. C. C. 5.)

E. W. Parker v. Southern Pacific, et al. Opinion by the commission:

The time limit on the going portion of excursion tickets to San Francisco had expired before the passengers arrived at Portland en route to San Francisco. The complainant had to pay for transportation from Portland to San Francisco and now seeks reparation. The commission found that the charge complained of was properly assessed in accordance with the defendant's published tariff and that it was in no way unjust or unreasonable. (24 I. C. C. 698.)

Differential to Gill, W. Va., Reduced.

B. Johnson & Son v. Chesapeake & Ohio, et al. Opinion by Commissioner McCord:

The commission found that the carrier's practice of charging a differential of four cents on shipments to Gill, a point on a branch line of the Chesapeake & Ohio, from Barboursville, the junction point of the branch line and the main line, while it charged differentials of only three cents from other main line junction points to branch line points similarly situated, was unduly discriminatory against Gill in favor of the other branch line points, and decided that in future a differential of three cents should be charged on shipments to Gill. Reparation was awarded.

The complainant also contended that the slightly higher rates to points in central freight association territory from Barboursville than from Big Sandy Junction and Ashland, nearby junction points, were unduly discriminatory against Gill. The commission found that the competitive conditions existing at the other junction points justified the slightly higher rate from Barboursville. (24 I. C. C. 698.)

Re-icing Charges Unreasonable and Discriminatory.

Crutchfield & Woolfolk v. Southern Pacific. Opinion by Commissioner Prouty:

In this case the complainant contends that the re-icing charges collected from it on shipments of canteloupes from the Imperial Valley, Cal., and Yuma, Ariz., to various eastern destinations during the seasons of 1908 and 1909, were unreasonable and discriminatory. During the period in question the refrigeration charge from points in the Imperial Valley to Chicago was $90 per car. The tariff also provided that the shipper should be charged for re-icing at the rate of $7.50 per ton for extra ice used. In the latter part of 1909 the price of this extra ice was reduced to $5 per ton. It was shown that the extra charge for re-icing varied between $1 and $48 per car, and the complainant contends that it was not responsible for the delays which in some cases made necessary the use of large amounts of ice in re-icing. The commission found that where the amount of ice used in re-icing depends upon the manner in which the car is handled by the carrier, the charge should be a gross sum for refrigeration, including re-icing where necessary and that the defendant's practice of making extra charges for re-icing, according to the amount of extra ice used, was discriminatory to some shippers in favor of others. The defendant filed a tariff for the season of 1910 by which the charge for refrigeration, including re-icing to Chicago was increased to $97.50 per car, with a provision that the shipper should be allowed a certain length of time after the car was placed for loading within which to load the same, and should pay $10 for 24 hours, or fraction thereof, for failure to do so. The commission found that the re-icing charges collected from the complainant on its shipments of canteloupes during the period in question were unreasonable and discriminatory to the extent that they exceeded the charge contained in the tariff which was filed for the season of 1910 and awarded reparation on that basis on the shipments made during 1908 and 1909. The commission pointed out that it merely found these latter rates reasonable for the seasons of 1908 and 1909, and that their reasonableness at the present time was not under consideration. The defendant contended that the demurrage charge as provided for in the tariff for the season of 1910 should be paid by the complainant where the delays could be proved; and also that the complainant should pay the defendant the difference on certain shipments made during the period in question where the charges were less than they would have been had the tariff for 1910 been in effect. The commission found that the demurrage charges could not be collected as the complainant had not been notified in advance of such charges, and also that the defendant should not receive more for the transportation of certain shipments than was provided for in its tariff in effect at the time when those shipments were made. (24 I. C. C., 651.)

Crutchfield & Woolfolk v. Southern Pacific. Opinion by Chairman Prouty:

A rehearing of the above case was asked on the ground that complainants were commission men and were, therefore, not entitled to damages. The commission found, however, that the complainants were under obligation to pay these freight rates and were, therefore, the only parties who could maintain suit for an overcharge or an excessive rate. The petition was denied. (24 I. C. C., 679.)

Differentials to Atlantic Seaboard Altered.

Chamber of Commerce of the State of New York, et al. v. New York Central & Hudson River et al. Opinion by Commissioner Clark:

The original report in this case is in 24 I. C. C., 55, which was mentioned in the *Railway Age Gazette* of June 21, 1912, page 1583. Differentials under New York on all-rail and lake-and-rail export shipments from differential territories to Baltimore and Philadelphia on all articles except flour and iron and steel will remain the same as those determined upon in the original report. On all-rail and lake-and-rail export shipments of flour the differentials under New York should not exceed two cents per 100 lbs. to Baltimore and one cent per 100 lbs. to Philadel-

phia. In the original report these differentials were three cents and two cents respectively. In the original report the differential on iron and steel articles was three cents to Baltimore and two cents to Philadelphia. This has now been changed as follows: from Chicago rate points to Baltimore, three cents per 100 lbs., to Philadelphia two cents per 100 lbs., from Detroit rate points, to Baltimore three cents per 100 lbs., to Philadelphia two cents per 100 lbs., from Pittsburgh rate points, from Cleveland rate points and from Youngstown rate points to Baltimore 1.5 cents per 100 lbs., to Philadelphia one cent per 100 lbs. These differentials should not be exceeded. Differentials on iron and steel articles from other points should not be made greater than they now are.

As regards import rates the commission in the original report decided that they should be the same from New York as from Boston. The commission now holds that via the standard all-rail line the standard rail-and-lake lines and the ocean-and-rail lines via Philadelphia, Baltimore, Norfolk and Newport News the import rates from Boston should not be lower than from New York; if the New York differential ocean and rail routes via New London, Conn., and the Central of Vermont and Grand Trunk roads are opened to import traffic from Boston, the import rate from Boston should not be lower than from New York; if the differential river-rail-and-lake line from New York via the Hudson River, the Rutland and the lakes is opened to Boston traffic, the import rate from Boston should not be lower than from New York; via the differential rail route from Boston, via the Boston & Maine and Boston & Albany roads in connection with the Canadian Pacific and National Despatch lines, the import rates from Boston may be the same as the domestic rates; via the differential rail-and-lake routes from Boston via the Boston & Maine, Grand Trunk and Canada-Atlantic Transit Company's lines through Depot Harbor the import rates from Boston may be the same as the domestic rates. All these import rates apply to both class and commodity rates. (24 I. C. C., 651.)

Import Rates from Boston and New York.

In re import rates. Opinion by Commissioner Clark:

This question was considered in a supplemental report in the *Chamber of Commerce of the State of New York v. New York Central & Hudson River*, 24 I. C. C., 674, which is abstracted above. (24 I. C. C., 678.)

STATE COMMISSIONS.

The Public Service Commission of Washington has canceled an order suspending the tariff filed by the Great Northern, establishing rates from Tacoma to points east of Everett, Wash., higher than the rates from Seattle, in accordance with a previous order of the commission prescribing maximum distance rates.

The California Railroad Commission has ordered a reinvestigation of the freight rates between Los Angeles and San Pedro harbor, and has also issued an order allowing the Southern Pacific, Atchison, Topeka & Santa Fe and the San Pedro, Los Angeles & Salt Lake to discontinue the absorption of the wharfage and handling charges at San Pedro.

COURT NEWS.

A New Jersey court, Judge William H. Speer, has declared unconstitutional, so far as it affects interstate railway traffic, the law of that state, enacted last year, limiting the amount of damages which an employee can recover for injuries resulting from negligence of the employer. As regards an employee of a railroad engaged in interstate commerce this state law is set aside by the act of Congress which regulates the payment of damages for injuries sustained by employees of such roads.

Jules E. Bernard of the Chicago forwarding house of Bernard, Judae & Co., August Bonteaux, Maurice Assher, Oscar F. Kesche and Albert E. Graser pleaded guilty on October 30 before Judge Mayer in the Federal District Court to receiving rebates from the Baltimore & Ohio. On Graser sentence was suspended. The others were sentenced to a day's imprisonment. In addition Bernard and Kesche have to pay a fine of $3,000 apiece and Bonteaux and Ascher a fine of $1,000 apiece.

REVENUES AND EXPENSES OF RAILWAYS.

TWO MONTHS OF FISCAL YEAR, 1913.

Name of road.	Average mileage operated during period.	Operating revenues: Freight.	Passenger.	Total, inc. misc.	Operating expenses: Maintenance: Way and structures.	Of equipment.	Traffic.	Transportation.	General.	Total.	Net operating revenue (or deficit).	Outside operations, net.	Taxes.	Operating income (or loss).	Increase (or decr.) comp. with last year.
Atlanta & West Point	93	$90,131	$88,419	$196,850	$28,347	$38,106	$10,950	$64,966	$10,058	$152,427	$44,423	$356	$11,355	$33,424	—$17,071
Atlantic City	167	146,768	513,131	689,074	38,944	24,206	11,005	267,128	3,217	344,500	344,574	—9,717	18,000	316,857	4,235
Belt, Ry. Co. of Chicago	21	.....	.....	512,059	29,338	66,495	1,085	189,312	8,278	294,508	217,551	.....	17,112	200,439	29,081
Buffalo & Susquehanna R. R.	265	259,306	20,298	288,025	58,353	45,847	2,606	94,179	12,237	213,222	74,803	.....	4,400	70,403	5,483
Buffalo & Susquehanna Ry.	91	83,287	24,942	113,078	19,726	55,582	1,050	43,102	5,548	125,008	—11,930	177	3,000	—14,753	—3,638
Central New Jersey	669[1]	3,758,186	1,194,072	5,217,745	441,283	701,176	64,400	1,441,991	83,614	2,732,464	2,485,281	135,735	256,488	2,364,528	579,541
Central Vermont	411	449,315	243,222	751,824	100,984	110,854	17,459	345,728	14,509	589,534	162,290	1,141	24,400	139,031	—41,185
Chicago & Erie	270	718,110	139,067	935,150	188,181	198,507	42,417	433,596	21,867	884,568	50,852	58	25,790	24,850	—79,543
Chicago, Rock Island & Gulf	477	348,863	108,620	492,045	88,136	46,696	21,435	173,555	14,864	344,686	147,359	—681	16,244	130,434	—579
Detroit & Toledo Shore Line	79	212,280	.....	213,193	46,864	11,778	2,388	57,359	4,552	122,941	90,252	.....	9,300	80,952	14,086
Duluth & Iron Range	274[2]	2,069,200	41,666	2,129,394	184,675	129,259	2,968	371,345	23,545	711,792	1,417,602	11,742	103,112	1,326,232	71,673
Erie	1,988[3]	6,893,578	1,963,506	9,529,435	1,147,985	1,561,416	190,846	2,877,410	165,140	5,892,797	3,636,638	2,458	277,093	3,362,003	278,304
Georgia	307	299,102	175,868	510,133	58,931	100,471	23,779	289,464	15,845	458,490	51,643	.....	5,440	46,203	—48,882
Hocking Valley	352	1,157,173	194,229	1,454,491	155,722	276,949	17,985	396,544	28,011	875,211	579,280	.....	69,600	509,680	62,484
International & Great Northern	1,160	1,164,053	459,985	1,727,118	274,571	242,206	50,695	691,438	60,366	1,319,276	407,842	—6,054	60,000	341,788	.....
Kansas City Southern	827	1,297,953	306,504	1,769,548	172,586	250,459	48,086	573,353	58,217	1,102,701	666,847	.....	71,684	595,163	155,775
Louisiana Western	208	243,558	103,791	362,755	32,703	55,090	14,052	106,253	11,663	219,761	142,994	1,209	13,657	130,546	40,333
Morgan's La. & Tex. R. R. & S. S. Co.	404	473,567	169,547	686,599	161,912	110,529	26,030	296,948	22,014	617,433	69,166	—2,780	36,740	29,646	—103,558
New Orleans, Mobile & Chicago	547[4]	286,020	66,236	375,888	65,542	39,583	6,603	132,110	14,804	258,642	117,246	—107	8,312	108,827	21,677
New Orleans, Texas & Mexico	277[5]	155,581	37,339	218,207	40,231	21,393	5,674	100,623	10,964	178,885	39,322	.....	24,000	38,030	25,417
New York, Susquehanna & Western	154[6]	309,072	112,331	467,035	71,396	64,163	3,303	192,941	8,135	339,938	127,097	—7,059	35,297	84,741	—91,970
Oahu Ry. & Land Co.	101[7]	187,926	44,603	246,971	17,699	13,452	1,012	44,916	7,529	84,608	162,363	567	13,000	149,930	20,918
Philadelphia & Reading	1,015	6,517,465	1,325,874	8,262,257	818,173	1,441,997	92,094	2,507,411	121,535	4,981,210	3,281,047	59,910	173,068	3,167,889	945,577
Port Reading	21	225,642	.....	235,546	26,189	1,591	63	61,228	407	89,478	146,068	7,374	16,000	137,442	55,460
San Antonio & Aransas Pass	727	569,336	269,196	878,986	140,883	100,335	12,019	307,023	20,253	580,513	298,473	.....	24,000	274,473	30,673
Toledo, St. Louis & Western	451	544,787	71,040	660,146	118,395	104,997	14,039	220,889	17,220	475,540	184,606	.....	29,600	155,006	—56,165
Ulster & Delaware	129	125,585	154,042	292,353	35,478	28,086	3,652	96,996	4,677	168,889	123,464	—240	6,600	116,624	—11,711
Wabash	2,515	3,658,387	1,419,262	5,487,200	731,732	978,205	185,681	1,965,390	125,917	3,986,925	1,500,275	—5,889	143,311	1,351,075	83,354
Western Maryland	543	955,189	228,722	1,236,023	148,736	161,384	25,303	448,862	23,668	807,953	428,070	.....	40,000	388,070	—46,423
Western Ry. of Alabama	133	91,438	92,436	200,290	43,046	45,179	11,309	62,550	10,729	172,813	27,477	181	9,281	18,377	—14,559
Wheeling & Lake Erie	459[8]	1,278,424	144,449	1,502,588	170,737	265,514	16,438	434,179	26,462	913,330	589,258	5,204	60,034	534,428	55,225
Western Pacific	937	773,769	264,791	1,074,159	185,767	99,026	61,871	387,775	51,095	785,534	288,625	70	39,667	249,028	15,371
Trinity & Brazos Valley	463	216,512	106,683	339,028	86,640	54,693	20,610	160,803	19,586	342,332	—3,304	.....	8,000	—11,304	6,442

Average mileage operated during previous period—[1] 672; [2] 263; [3] 1,995; [4] 404; [5] 264; [6] 152; [7] 99; [8] 457. —Indicates Deficits, Losses and Decreases.

Railway Officers.

ELECTIONS AND APPOINTMENTS.

Executive, Financial and Legal Officers.

P. C. Hardy, acting freight claim agent of the Bangor & Aroostook at Bangor, Maine, has been appointed freight claim agent.

Fred E. Jones has been appointed freight claim agent of the San Antonio & Aransas Pass, with headquarters at San Antonio, Tex.

F. Lethenstrom has been appointed auditor of the Marietta, Columbus & Cleveland, with headquarters at Marietta, Ohio, succeeding Robert G. Shorter, resigned.

Richard Kirkwood, assistant auditor of the Minneapolis, St. Paul & Sault Ste. Marie, has been appointed acting auditor, with office at Minneapolis, Minn., in place of Robert Toombs, deceased.

George W. Richards, vice-president and treasurer of the Potomac, Fredericksburg & Piedmont, at Fredericksburg, Va., has been elected president, succeeding his father, L. H. Richards, deceased.

L. F. Timmerman, secretary and assistant treasurer of the Western Maryland, at New York, has been elected treasurer, succeeding Major J. T. M. Barnes, who has resigned on account of ill health.

William P. Kenney, whose election as vice-president of the Great Northern has been announced in these columns, was born in 1870, at Waterville, Wis. He began railway work as telegraph operator, and later was contracting agent. Subsequently he was made chief clerk in the general freight office of the St. Paul & Duluth at St. Paul, Minn., and when that road was absorbed by the Northern Pacific he continued in the same capacity. Later he went to the Great Northern as assistant to the fourth vice-president and was afterward appointed assistant traffic manager under W. W. Broughton, which position he held until September, 1911. He was then promoted to general traffic manager, and on October 1, became vice-president in charge of traffic, with headquarters at St. Paul.

W. P. Kenney.

Alfred G. Ellick, assistant county attorney and a member of the law firm of Ellick & Brome, of Omaha, Neb., has been appointed assistant attorney for the Union Pacific, with headquarters at Omaha.

John T. Hendricks, who has been elected vice-president in charge of traffic of the Western Maryland, with headquarters at Baltimore, Md., as has been announced in these columns, was born on September 20, 1867, at Shelbyville, Ind. He began railway work in April, 1886, on the Cincinnati, Hamilton & Dayton, and from 1889 to 1892 was traveling freight agent of the Atchison, Topeka & Santa Fe, with headquarters at Cincinnati, Ohio. He was then general agent of the International & Great Northern until September, 1894, and for three years was general agent of the Gould lines in Texas. His next position was general agent of the Union Pacific, at Philadelphia, Pa., where he remained until November, 1905, when he became assistant general freight agent of the Western Maryland, at Baltimore, Md. He was promoted to freight traffic manager on January 15, 1906, which position he held at the time of his recent election as vice-president of the same road, as above noted.

Charles H. Hix, who resigned as vice-president and general manager of the Seaboard Air Line, as has been announced in these columns, has been elected president and general manager of the Norfolk Southern. He was born in Nelson county, Va., in 1862, and began railway work in 1880 as rodman in the engineering corps of the Norfolk & Western. In the winter of 1881 he was made receiving and delivery clerk at Saltville, and later became assistant agent and operator, leaving that position in 1884 to become agent at Buford. In 1886 he was appointed relief agent and two years later train despatcher at Roanoke, and in 1891 chief despatcher. He was appointed trainmaster of the Radford division in 1897, and later, owing to a change in administration, he was again appointed chief despatcher, remaining in that position until July, 1900, when he left that road to go to the Seaboard Air Line, as trainmaster of the Second division, becoming trainmaster of the First division in June, 1901, and in September superintendent of the First division. In September, 1905, he was promoted to general superintendent, and in July, 1909, was made general manager, becoming vice-president and general manager of the same road in December, 1909, which position he recently resigned to become president of the Norfolk Southern, as above noted. Mr. Hix has been made a member also of the executive committee, and a director of the Norfolk Southern.

Charles H. Hix.

James M. Gruber, whose election as vice-president of the Great Northern, has been announced in these columns, was born March 22, 1868, at Iowa City, Ia. He was educated in the common schools, graduating from the Iowa City high school in June, 1885. He began railway work September 12, 1885, as stenographer in the general freight office of the St. Paul, Minneapolis & Manitoba at St. Paul, and in October of the following year was transferred to the general manager's office as stenographer, where he remained until September, 1889. He then went to the Atchison, Topeka & Santa Fe as stenographer for the president, and in December, 1890, became clerk in the superintendent's office of the Gulf, Colorado & Santa Fe at Temple, Tex. He was promoted to chief clerk to the superintendent at Cleburne, Tex., in March, 1891, and six months later was made assistant trainmaster at Gainesville, Tex. In December, 1892, he was appointed trainmaster at Temple, Tex., and in April, 1893, was transferred to Galveston, Tex., as chief clerk to the superintendent of transportation, remaining there until July, 1894, when he became trainmaster at Galveston. He was appointed

J. M. Gruber.

assistant superintendent of the Eastern Railway of Minnesota at West Superior, Wis., in January, 1895; six months later was made superintendent of that road, and in July, 1896, accepted the general superintendency of the Montana Central, with office at Great Falls, Mont. Mr. Gruber was assistant general superintendent of the Great Northern, with headquarters at St. Paul, from March, 1897, to April, 1903, when he resigned to become general superintendent of the Chicago, Rock Island & Pacific at Topeka, Kan. He went to the Union Pacific in February, 1904, where he remained a year as general superintendent, with headquarters at Omaha, Neb. From February, 1905, to October, 1907, he was general manager of the Chicago, Burlington & Quincy at Chicago, and on the latter date he became general manager of the Great Northern, which position he held until he was elected vice-president on October 12.

Philip J. Kelly has been appointed auditor traffic receipts of the Philadelphia & Reading and subsidiary lines, and Thomas S. Neale, acting auditor coal traffic at Philadelphia, Pa., has been appointed auditor coal traffic.

W. J. Harahan, president of the Seaboard Air Line, has been elected president also of the Tampa Northern, with office at Norfolk, Va., succeeding Charles R. Capps, who has been elected vice-president in charge of traffic, with office at Norfolk.

Operating Officers.

Henry J. Roth has been appointed inspector of transportation of the Illinois Central, with headquarters at Chicago.

F. H. Hohnsbean has been appointed trainmaster of the Missouri, Kansas & Texas, with headquarters at Smithville, Tex.

R. F. Shuman has been appointed trainmaster of the Chicago & Alton, with headquarters at Roodhouse, Ill., succeeding C. W. Bearden, promoted.

A. D. McCarthy has been appointed trainmaster of the Fourth district and Montreal terminals of the Grand Trunk, with headquarters at Montreal, Que.

W. T. R. Hoddinott has been appointed assistant trainmaster of the Philadelphia division of the Baltimore & Ohio, with headquarters at Philadelphia, Pa.

E. D. Hogan, assistant superintendent of the San Antonio & Aransas Pass, has been appointed assistant general manager, with headquarters at Yoakum, Tex.

F. S. James has resigned as division superintendent of the Missouri, Kansas & Texas and superintendent of the Texas Central, with headquarters at Waco, Tex.

Edgar W. Batchelder, division superintendent of the Erie Railroad at Meadville, Pa., has been appointed assistant general superintendent, with headquarters at Marion, Ohio.

J. M. Walsh, superintendent of terminals of the St. Louis & San Francisco at Memphis, Tenn., has been appointed superintendent of terminals of the Illinois Central, with office at Memphis.

E. L. Magers, assistant division superintendent of the St. Louis & San Francisco at Ft. Scott, Kan., has been appointed superintendent of terminals, with headquarters at Memphis, Tenn., succeeding J. M. Walsh, resigned. O. D. Lewis, chief train despatcher at Ft. Scott, succeeds Mr. Magers.

E. G. Atkins, trainmaster of the Chicago, Milwaukee & St. Paul at LaCrosse, Wis., has been appointed superintendent of the Southern Minnesota division, with office at LaCrosse, succeeding E. G. Perkins, deceased. F. J. Holmes, chief train despatcher, succeeds Mr. Atkins.

J. C. Muir, general superintendent of the Chicago & Eastern Illinois, with office at Danville, Ill., has been appointed superintendent of the Chicago division, with headquarters at Danville, and the former position has been abolished. Mr. Muir succeeds G. H. Trenary, who has been transferred to Salem, Ill., as superintendent of the Illinois division in place of P. S. Sampson, assigned to other duties.

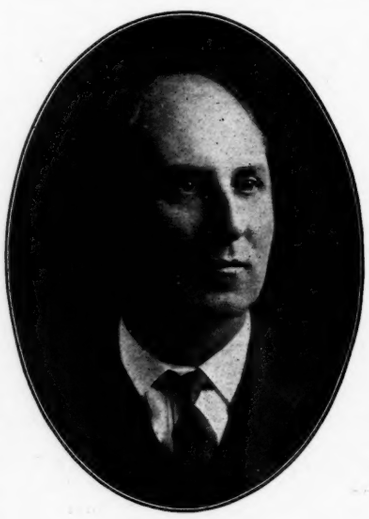
S. Ennes has been appointed superintendent of the Mesabi division, and B. Lantry, superintendent of the Superior division of the Great Northern, with headquarters at Superior, Wis., to succeed G. S. Stewart, who has been made superintendent of the Montana division, with office at Havre, Mont., in place of F. D. Kelsey. Mr. Kelsey succeeds Mr. Ennes as superintendent of the Breckenridge division, with headquarters at Breckenridge, Minn. Effective November 1.

W. H. Beeland, whose appointment as assistant superintendent of the Tennessee Central, with headquarters at Nashville, Tenn., has been announced in these columns, was born on September 14, 1874, in Lee county, Alabama, and was educated in the common schools. He began railway work in 1892 as a brakeman on the Atlanta & West Point and the Western of Alabama. Three years later he was promoted to conductor, and in 1901 went to the Tennessee Central as conductor, which position he held at the time of his recent appointment as assistant superintendent of the same road.

S. P. Henderson, who has been appointed superintendent of the Northern division of the Chicago & Alton, with headquarters at Bloomington, Ill., as has been announced in these columns, began railway work as a telegraph operator on the Chicago, Indianapolis & Louisville at Monticello, Ind. He was later with the Chicago, Rock Island & Pacific, the Cleveland, Lorain & Wheeling, now a part of the Baltimore & Ohio, and the Chesapeake & Ohio, first as despatcher, and then as chief despatcher. He was then superintendent of the Buffalo & Susquehanna, with office at Galeton, Pa., and later was superintendent of the Kansas City Southern at Mena, Ark. At the time of his recent appointment as superintendent of the Chicago & Alton, he was trainmaster of the Chicago & Alton, with headquarters at Bloomington, Ill.

S. P. Henderson.

C. W. Miller, whose appointment as superintendent of the Southern division of the Chicago & Alton, with headquarters at Bloomington, Ill., has been announced in these columns, began railway work as a brakeman on the Cleveland Terminal & Valley, now a part of the Baltimore & Ohio. In 1889 he went to the Wheeling & Lake Erie, and the following year was promoted to conductor. He was later in the yard and train service of the Chicago & Alton, also of the Northern Pacific, and of the Cleveland, Canton & Southern, remaining with the latter company until it was absorbed by the Wheeling & Lake Erie. In 1905 he was promoted to trainmaster on the Cleveland division of the Wheeling & Lake Erie, which position he held at the time of his recent appointment as superintendent of the Chicago & Alton, as above noted.



C. W. Miller.

Benjamin L. Bugg, whose appointment as assistant general manager of the Atlanta, Birmingham & Atlantic, with head-

quarters at Atlanta, Ga., has been announced in these columns, was born on August 8, 1869, at Palo Alto, Miss. He received a high school education and began railway work as a telegraph operator in 1887 on the Florida Railway & Navigation Company, now a part of the Seaboard Air Line. In 1891 he went to the Georgia Southern & Florida, and in 1895 left that company to go to the Central of Georgia. He was appointed general agent of the Old Dominion Steamship Company, at Norfolk, Va., in 1907; in August, 1910, he resigned to go to the Norfolk Southern as traffic manager, and in February, 1912, his authority was extended over the Raleigh, Charlotte & Southern. On September 1, 1912, he was appointed traffic manager of the Atlanta, Birmingham & Atlantic, and now becomes assistant general manager of the same road, as above noted.

George H. Emerson, whose appointment as general manager of the Great Northern, with headquarters at St. Paul, Minn., was announced in our issue of October 18, began railway work as water boy on the Willmar division of the Great Northern during the summer of 1880. In April, 1882, he became an apprentice in the shops at St. Paul, and in October, 1887, became a boilermaker. From September, 1890, to February, 1895, he was fireman and engineer on the Dakota division of that road and was appointed locomotive foreman at Glasgow, Mont., in 1895. Two years later he was made general shop foreman and master mechanic of the Dakota and Northern divisions, where he remained until January 1, 1900, at which time he was promoted to general master mechanic of the Western district. On January 10, 1903, Mr. Emerson was appointed superintendent of motive power of the entire system, and on March 15, 1910, he was made assistant general manager, from which position he is now promoted to that of general manager.

Traffic Officers.

G. W. Oliver has been appointed assistant statistician of the Atchison, Topeka & Santa Fe, with headquarters at Chicago.

C. W. Pinney has been appointed general western freight agent of the Coal & Coke Railway, with headquarters at Columbus, Ohio.

W. B. Butler has been appointed soliciting freight agent of the Georgia Southern & Florida, with office at Atlanta, Ga., succeeding J. H. Donnell, resigned.

J. A. Fullerton has been promoted to soliciting freight agent of the Buffalo, Rochester & Pittsburgh, reporting to assistant general freight agent, Buffalo, N. Y.

W. L. Greiner, traveling freight agent of the New York Central Lines at Salt Lake City, Utah, has been appointed commercial agent, with office at Salt Lake City, succeeding Kent O. Keyes, resigned.

Joseph W. Brady has been appointed traveling freight agent of the Toledo, St. Louis & Western, with headquarters at Toledo, Ohio, in place of H. C. Weber, promoted. F. M. Miller has been appointed traveling freight agent, with office at Pittsburgh, Pa.

Samuel Wilson, export and import agent of the Chicago, Milwaukee & Puget Sound, with office at Seattle, Wash., has been appointed assistant general freight agent, with headquarters at Seattle, succeeding J. R. Veitch, transferred. F. J. Calkins succeeds Mr. Wilson.

S. A. Hess, ticket agent of the Wabash at Decatur, Ill., has been appointed division passenger agent, with headquarters at Decatur. H. P. Gardner has been appointed passenger and ticket agent, with office at Springfield, Ill., in place of R. C. Fleming, resigned to engage in other business.

J. M. Farriss, commercial agent of the Sunset-Central Lines at Corsicana, Tex., has been appointed division freight and passenger agent, with headquarters at Austin, Tex., succeeding C. M. Reeves, who has resumed his duties as city passenger and ticket agent at Austin. J. H. Evetts succeeds Mr. Farriss at Corsicana. C. T. Collette has been appointed traveling freight and passenger agent, with office at Oklahoma City, Okla. F. L. Sheeks, local agent at Beaumont, Tex., has also been appointed general agent in charge of the traffic department, in place of J. W. Wilkinson, resigned. T. L. Cleveland has been appointed traveling freight and passenger agent, with headquarters at Beaumont, Tex.

Engineering and Rolling Stock Officers.

Raymond E. Bell, general foreman of the Gulf, Colorado & Santa Fe at Galveston, Tex., has been appointed master mechanic of the Galveston division, with headquarters at Galveston.

A. B. Ziegweid has been appointed division engineer of the Pere Marquette, in charge of maintenance of way and structures in territory comprising Saginaw-Ionia and S. T. & H. divisions and branches, with office at Saginaw, Mich.

E. Schultz, roundhouse foreman of the Chicago & North Western at Milwaukee, Wis., has been appointed master mechanic of the Northern Wisconsin and Lake Shore divisions, with headquarters at Green Bay, Wis. He succeeds E. Becker, who has been transferred to Escanaba, Mich., as division master mechanic to take the place of F. Slater, appointed division master mechanic, with office at Kaukauna, Wis., succeeding W. Hutchinson, deceased.

OBITUARY.

Frank Shelley Spafard, assistant superintendent of telegraph of the Chicago, Rock Island & Pacific, died at Chicago in the early part of this week.

John L. Kirkpatrick, traveling passenger agent of the Lehigh Valley at Philadelphia, Pa., died at his home in that city on October 30. Mr. Kirkpatrick was 42 years old and had been connected with the Lehigh Valley company since 1894. He was president of the Quaker City Association of Railroad Men.

Charles F. Melick, general freight and passenger agent of the Mexican Railway and secretary of the Vera Cruz Terminal Company, with headquarters at Mexico City, Mex., died recently in that city. Mr. Melick was born on September 28, 1867, at Roseville, Ohio, and was educated in the common schools. He began railway work in 1883, and for a time was bill clerk on the Baltimore & Ohio. He was later chief clerk in the general freight office of the Pittsburgh & Western, now a part of the Baltimore & Ohio, and was then made contracting agent on the same road. From 1890 to 1893 he was out of railway work. He then went to the National Railways of Mexico as claim clerk, and since July 15, 1904, had been general freight and passenger agent of the Mexican Railway.

John M. Whitman, formerly vice-president of the Chicago & North Western, died on October 29 at Chicago. He was born in 1837 at Elbridge, Onondaga County, N. Y., and began railway work in 1856 in the engineering department of the Illinois Central. From 1858 to 1860 he was a leveler on enlargement work on the Erie Canal. Next he became engineer in charge of construction for the Brunswick & Albany, now part of the Atlantic Coast Line. He was then for one year engineer in charge of construction of the Union Stock Yards, at Chicago, and from 1867 to 1869 was engineer engaged in deepening the Illinois and Michigan Canal. In 1869 he became engineer in charge of construction of the Iowa Midland, now a part of the Chicago & North Western, and from 1872 to 1876 was engineer and superintendent of the Chicago & Pacific, now a part of the Chicago, Milwaukee & St. Paul. In the latter year he was appointed receiver and superintendent of that road. In June, 1880, he was appointed superintendent of the Iowa division of the Chicago & North Western, and in February, 1883, he was made general superintendent of the Chicago, St. Paul, Minneapolis & Omaha, becoming general manager of the Chicago & North Western in August, 1887. He was elected fourth vice-president of the same road in November, 1899, and in January, 1906, was made vice-president in charge of construction, from which position he was retired under the pension rules of the company on June 30, 1911.

NEW LINE PROPOSED FOR BOLIVIA.—Preliminary surveys are being made on a proposed line which will run from Cochabamba, central eastern Bolivia, northwest to Chimore, about 200 miles.

NEW ARGENTINE RAILWAY COMPANY.—The Corrientes Railway Company was organized in England last May with $5,000,000 capital, half of which is 7 per cent. preferred stock, to build railroads in the province of Corrientes, Argentina, under concession recently granted.

Equipment and Supplies.

LOCOMOTIVE BUILDING.

THE ILLINOIS TERMINAL RAILROAD has ordered 1 mogul locomotive from the Baldwin Locomotive Works.

THE POLSON LOGGING COMPANY has ordered 1 mikado locomotive from the Baldwin Locomotive Works.

THE SAGINAW TIMBER COMPANY has ordered 1 mikado locomotive from the Baldwin Locomotive Works.

THE CHICAGO & NORTH WESTERN is said to have ordered 130 locomotives. This item has not been confirmed.

THE PHILADELPHIA SUBURBAN GAS & ELECTRIC COMPANY has ordered 1 four-wheel switching locomotive from the Baldwin Locomotive Works.

THE BRITISH COLUMBIA ELECTRIC, Vancouver, B. C., has ordered five 50-ton electric locomotives from the Westinghouse Electric & Manufacturing Company.

THE MAINE CENTRAL has ordered 8 consolidation locomotives, two Pacific type locomotives and two switching locomotives from the American Locomotive Company.

THE CAMBRIA STEEL COMPANY has ordered 2 six-wheel switching locomotives from the American Locomotive Company. The dimensions of the cylinders will be 21 in. x 26 in., the diameter of the driving wheels will be 50 in., and the total weight in working order will be 145,000 lbs.

THE KEESVILLE, AUSABLE CHASM & LAKE CHAMPLAIN has ordered 1 mogul locomotive from the American Locomotive Company. The dimensions of the cylinders will be 16 in. x 22 in., the diameter of the driving wheels will be 48 in., and the total weight in working order will be 96,000 lbs.

THE CENTRAL RAILWAY OF PERU has ordered 6 mikado locomotives from the American Locomotive Company. The dimensions of the cylinders will be 20 in. x 28 in., the diameter of the driving wheels will be 52 in., and the total weight in working order will be 175,000 lbs. These locomotives will be equipped with superheaters.

THE BRAZIL RAILWAY has ordered 8 Mallet (2-6-6-2) locomotives from the American Locomotive Company, and 13 ten-wheel switching locomotives from the Lima Locomotive Corporation. The Mallet locomotives will be equipped with superheaters, will have 16 in. and 25 in. x 20 in. cylinders, 41¾ in. driving wheels, and in working order will weigh 157,000 lbs.

CAR BUILDING.

THE MISSOURI PACIFIC is in the market for 2,000 box cars and 2,000 gondolas.

ST. PAUL, MINNEAPOLIS & SAULT STE. MARIE is in the market for a number of mail cars.

THE ATCHISON, TOPEKA & SANTA FE has ordered 25 ore cars from the National Dump Car Company.

THE MAINE CENTRAL is in the market for 6 passenger cars and 2 combination passenger and baggage cars.

THE NEW YORK, NEW HAVEN & HARTFORD has ordered 50 passenger coaches from the Osgood Bradley Car Company.

THE CHESAPEAKE & OHIO is said to have ordered 3,000 coal cars from the Western Steel Car & Foundry Company. This item has not been confirmed.

THE PENNSYLVANIA RAILROAD has ordered 3,000 box cars and 1,000 automobile cars from the Pressed Steel Car Company, and 1,000 box cars from the company's shops at Altoona.

THE NEW YORK CENTRAL & HUDSON RIVER has ordered 1,000 refrigerator cars from the American Car & Foundry Company, and 1,000 refrigerator cars from the shops of the Merchants' Despatch Transportation.

THE NORTHERN PACIFIC is said to have ordered 1,100 refrigerator cars from the Pullman Company, 200 ore cars and 500 gondola cars from the Pressed Steel Car Company, and 250 stock cars from the Mt. Vernon Car & Manufacturing Company. This item has not been confirmed.

THE KANSAS CITY SOUTHERN, as mentioned in the *Railway Age Gazette* of October 18, has ordered 1,000 steel underframe gondolas from the American Car & Foundry Company for February and March delivery. These cars will have a capacity of 40 tons, and the estimated weight is 44,900 lbs. The inside measurements will be 41 ft. long and 4 ft. 2 in. high. Some of the special equipment will be as follows:

Brakes—Westinghouse.
Brakebeams—Chicago Railway Equipment Co.
Brakeshoes—American Brake Shoe & Foundry Co.
Couplers—Sharon.
Journal Boxes—McCord.

THE NEW YORK CENTRAL LINES have ordered 100 passenger coaches from the American Car & Foundry Company, 35 passenger coaches and 40 baggage cars from the Barney & Smith Car Company, 25 baggage cars from the Standard Steel Car Company, and 7 dining cars from the Pullman Company. Of this equipment the New York Central & Hudson River will receive 100 passenger coaches from the American Car & Foundry Company, 40 baggage cars from the Barney & Smith Car Company, and 2 dining cars from the Pullman Company; the Michigan Central will receive 20 passenger coaches from the Barney & Smith Car Company, 10 baggage cars from the Standard Steel Car Company, and 2 dining cars from the Pullman Company; the Lake Shore & Michigan Southern will receive 15 passenger coaches from the Barney & Smith Car Company, 15 baggage cars from the Standard Steel Car Company and 2 dining cars from the Pullman Company; the Cleveland, Cincinnati, Chicago & St. Louis will receive 1 dining car from the Pullman Company.

IRON AND STEEL.

THE INTERBOROUGH RAPID TRANSIT is in the market for 7,000 tons of rails.

THE NEW YORK, NEW HAVEN & HARTFORD is in the market for 35,000 tons of rails.

THE BROOKLYN RAPID TRANSIT is in the market for 20,000 tons of rails.

GENERAL CONDITIONS IN STEEL.—Notwithstanding the fact that the presidential election is close at hand and that Europe has been disturbed by the Balkan war, orders in the steel industry have shown an increase rather than a decrease. The heaviest orders are being placed by the railroads and by the equipment companies. A considerable increase in unfilled tonnage is expected for October. It is now predicted that the net earnings of the steel corporation for October will be in the neighborhood of $12,000,000, as compared with $10,157,993 in September. The larger steel companies are trying to prevent an increase in prices, but some of the smaller companies continue to sell at figures above the so-called official quotations on a number of products.

ARGENTINE RAILWAY CONSTRUCTION.—Construction work on the Buenos Aires Great Southern Railway toward the Andes is being rapidly pushed forward and it is expected that by the end of the year the line will be open to traffic as far as Zapala, at the foot of the Andes. This very popular center of the Neuquen territory will then be directly connected by rail with Bahia Blanca, on the Atlantic coast, and it is confidently expected that a new market will be created for goods from Neuquen, which lies about 300 miles east of Bahia Blanca.

PROPOSED RAILWAY CONSTRUCTION IN ARGENTINA.—There has been presented to the legislature of the province of Entre Rios a petition for a loan of $6,000,000, bearing 5 per cent. interest and one-half of 1 per cent. amortization, for construction of lines from Parana, in the extreme western portion of the province of Entre Rios, northeast to Concordia via La Paz, Feliciano, and Libertad; from Parana to Concordia direct, about 170 miles; from Parana southeast to Gualeguay, about 120 miles; and branches connecting Villaguay, which is about 100 miles east of Parana, with the last two lines.

Supply Trade News.

The National Tube Company, Pittsburgh, Pa., has opened a branch office at St. Paul, Minn.

The Minneapolis & Northern, Minneapolis, Minn., has ordered two 55-ft. motor cars from the McKeen Motor Car Company.

The Buffalo Forge Company, Buffalo, N. Y., has received orders for hot blast heating systems for the roundhouses of the Western Maryland, at Hagerstown, Md., and Cumberland, for the roundhouse of the Erie at Galion, Ohio, and Huntington, Ind.; and for the Buffalo, Rochester & Pittsburgh roundhouses at Du Bois, Pa.

George E. Long, treasurer of the Joseph Dixon Crucible Company, Jersey City, N. J., has been made vice-president, succeeding William H. Corbin, deceased; J. H. Schermerhorn, assistant secretary and assistant treasurer of the same company, has been made treasurer and a member of the board of directors; and Albert Norris has been made assistant secretary and assistant treasurer.

Reginald M. Campbell has been appointed to a position in the sales department of the National India Rubber Company, with headquarters in New York. Mr. Campbell was for six years in the electric street railway and lighting department of the Western Electric Company, Chicago. For the next five years he acted as district sales agent for the Ohio Brass Company in the New York and New England territories. Later he was made eastern sales manager for the Peter Smith Heater Company, Detroit, Mich., with offices in New York. His time now will be devoted to the sale of bare and insulated wires and cables for all types of electrical requirement.

The Westinghouse Electric & Manufacturing Company, Pittsburgh, Pa., has received among recent orders an order from the Pittsburgh Railways, Pittsburgh, Pa., for two 1,000 kw. 2 bearing, 514 r. p. m., motor generator sets consisting of one 1,000 kw. 550 v., compound wound, direct-current generator and one 1,440 h. p. 3-phase, 60-cycle, 10,000 v. synchronous motor; also three 250 kva., 60-cycle, 22,000—376 transformers and complete switchboards for 4 sub-stations, together with auxiliary apparatus for this equipment. This company has also received an order from the Jackson Railway, Jackson, Fla., for one synchronous motor-generator set consisting of one 500 kw. 600 v. direct-current machine direct connected to one 720 h. p. 2,300 v. 3-phase, 60-cycle synchronous motor together with one switchboard for control of same.

At the annual meeting of the stockholders of the Carbon Steel Company, New York, the following board of directors was elected for the ensuing year: Charles McKnight, Gilbert G. Thorne, Edward C. Hoyt, George S. Macrum, Edward F. Slayback, D. E. Corbett, and Thomas Patterson. At a meeting of the board of directors the following officers were elected: President, Charles McKnight; vice-president, Gilbert G. Thorne; second vice-president, George S. Macrum; treasurer, James Thorne; and secretary D. E. Corbett. The company is spending approximately $100,000 on its works at Pittsburgh, Pa. The capacity of the forge shops has been increased, and a new 500-ton forging press has been installed. The stockholders have authorized a $2,000,000 bond issue to take care of the present bonded indebtedness and to furnish additional working capital. A sufficient amount of the bonds has been underwritten to provide for all present needs.

TRADE PUBLICATIONS.

CRANES, TROLLEYS, ETC.—The New Jersey Foundry & Machine Company, New York, has published a small folder illustrating a number of installations of its cranes, tracks, trolleys and hoists.

JOLT RAMMING MACHINE.—The Vulcan Engineering Sales Company, Chicago, has published in a small folder the distinctive and essential features and advantages of the Mumford jolt ramming machine

Railway Construction.

New Incorporations, Surveys, Etc.

ARKANSAS NORTHWESTERN.—An officer writes that the plans call for building, from Springtown, Ark., northeast via Vaughn and Bentonville to Pea Ridge, with a branch from this line south to Cave Springs, and another branch south to Rogers. In all about 30 miles. Contracts for the work are to be let soon by the Benton County Construction Company. There will be one trestle, 192 ft. long. The company expects to develop a traffic in fruit, timber, livestock and dairy products. C. E. McClure is president, with headquarters at Bentonville and at St. Louis, Mo., and E. B. Whitcomb is chief engineer, Bentonville, Ark. (October 18, p. 774.)

BANDON & OREGON EASTERN.—Incorporated in Oregon with $100,000 capital and headquarters at Bandon. The plans call for building from Bandon, Ore., south through the counties of Coos, Curry and Josephine. A branch is to be built north from Bandon to a point near Marshfield, and another branch is to be built west to the Pacific coast at Port Orford. The incorporators include R. C. Nelson, J. V. Beach and N. D. Simon.

BOSTON & MAINE.—An officer is quoted as saying that work is to be finished this year on the Hampden Railroad building from the Central Massachusetts division of the Boston & Maine at Bondville, Mass., southwest to Springfield, about 20 miles.

CHICAGO, ROCK ISLAND & PACIFIC.—The report of this company for the year ended June 30, 1912, shows that the construction of the St. Paul & Kansas City Short Line, between Carlisle, Iowa, and Allerton, is well under way. About 85 per cent. of the grading, and about 80 per cent. of the bridging was completed at the end of the fiscal year, and 22 miles of rails had been laid up to October 1, 1912. A charter was granted in 1911 to the Malvern & Camden, which plans to build about 60 miles of line from Malvern, in Hot Spring county, Ark., south to Camden through the counties of Hot Spring, Dallas and Ouachita. At the close of the fiscal year about 45 per cent. of the grading and bridging was completed and track laying will be started about November 1. During the year 73 industrial side tracks were constructed to private industries, and four to coal mines, making a total of 77 new tracks. Extensions and rearrangement of tracks were also made to 12 industries and to three coal mines.

FLEMINGTON, HINESVILLE & WESTERN.—An officer writes that the plans call for building from McIntosh, Ga., west via Flemington and Hinesville to Glenville, about 30 miles. Track has been laid and is now in operation on a section of five miles to Hinesville. The company expects to complete the work on the entire line in the near future. There will be trestles at Goslin swamp, at Martin's branch, and at Warrior swamp. A. D. Way is president, Hinesville. (October 11, p. 709.)

GULF, FLORIDA & ALABAMA.—The first work train was run into Pensacola, Fla., on October 19, the extension from Cantonment to Pensacola, 20 miles, being completed. Freight service will be begun by December 1. The road now extends from Pensacola, Fla., to Local, Ala., 82 miles; Gatewood Junction to Gatewood, 11 miles, with sidings seven miles, and is under construction to Pine Hill, 70 miles. The company owns piers, etc., in Pensacola. (August 23, p. 366.)

HAMPDEN RAILROAD.—See Boston & Maine.

HOCKING VALLEY.—See Toledo, Ohio, under Railway Structures.

KANSAS ROAD.—Application has been made for a charter in Kansas by a company to build 500 miles of railway. The line will cross Kansas from Republic county south to Comanche county, with a branch east to Kansas City. The incorporators include J. R. Mulvane and W. W. Webb, of Topeka, Kans.; O. T. Johnson, and L. C. Haecke, of New York.

MALVERN & CAMDEN.—See Chicago, Rock Island & Pacific.

MERIDIAN & MEMPHIS.—An officer writes that a general contract has been given to J. A. Perdue & Co., Pine Bluff, Ark., to build from Meridian, Miss., northwest to the New Orleans, Mobile & Ohio, at Union, 32.4 miles. Newell & Wright, Meridian, has contracts for the bridges and track laying, and

the Vance Contracting Company, Birmingham, Ala., for the steam shovel work. The grading work is about 40 per cent. finished, the bridges are about 50 per cent. finished, and track laying is to be started about November 1; 60-lb. rails will be used. The work involves constructing about 600,000 cu. yds. of embankment, and there will be 6,000 ft. of trestles and 450 ft. of steel work for overhead crossings over three railways. The company expects to develop a traffic in lumber, cotton, grain and western products. J. T. Schley, president, Mobile, Ala. S. A. Neville, vice-president, Meridian, Miss.

Oregon, Pacific & Eastern.—Incorporated in Oregon with $1,000,000 capital. The plans call for a line from Cottage Grove to Winchester bay, 25 miles. The section from Cottage Grove to Disston has already been built. A. B. Wood and H. Eakin, president of the First National Bank, Cottage Grove, are incorporators.

St. Paul & Kansas City Short Line.—See Chicago, Rock Island & Pacific. (October 25, p. 791.)

Savannah Union Railway & Terminal Company.—An officer writes that this company was incorporated in Georgia, to build a railway connecting the mill site of the Great Eastern Lumber Company on the Savannah river, seven miles above Savannah, with all the railways entering Savannah. About five miles of track has been laid. The company plans to develop a terminal business at the point where it reaches the Savannah river, and where it will have deep water facilities. Charles E. Gill is president, Savannah.

RAILWAY STRUCTURES.

Afton, Okla.—See Van Buren, Ark.

Arthur City, Tex.—See Van Buren, Ark.

Buford, Ga.—The Southern Railway has asked for bids for a new passenger station at Buford, and for converting the present station into a freight depot. The new building will be of half stucco finish with tile roof, and will have waiting rooms for white and colored passengers.

Gastonia, N. C.—Contract for the construction of the new passenger station at Gastonia, has been given by the Southern Railway to George Leigh & Co., Louisa, Va. The building will be of brick construction with tile roof, with waiting rooms for white and colored passengers. Work will be begun as soon as the necessary materials can be assembled, and will be pushed to completion. (August 16, p. 330.)

Lenoir City, Tenn.—The Southern Railway announces that it will soon erect a new passenger station at Lenoir City, and will convert the present combination depot into a freight depot. The new building will have a tile or slate roof with waiting rooms for white and colored passengers.

Mountainburg, Ark.—See Van Buren, Ark.

Silverdale, Ont.—The location for a station to be built at Silverdale, by the Toronto, Hamilton & Buffalo, has been approved by the board of railway commissioners of Canada.

Toledo, Ohio.—The Toledo council voted recently to vacate certain streets and alleys and to grant the Hocking Valley the right to cross other streets. As a result the railway company will soon begin construction on its proposed $2,000,000 terminal in East Toledo. The plan provides for 30 tracks at some points and 20 at others, also the construction of a viaduct at Front street over the tracks, and for an overhead crossing at Seamon street; the separation of grades at Starr avenue and for the erection of overhead crossing at the boulevard sites. The company is also to provide two streets connecting Seamon street and Starr avenue in return for thoroughfares vacated.

Tulsa, Okla.—See Van Buren, Ark.

Van Buren, Ark.—According to press reports plans have been made by the St. Louis & San Francisco to build three bridges, at a cost of about $1,000,000. The bridges are to be constructed across the Arkansas river at Van Buren, Ark.; at Tulsa, Okla., and at the Red river at Arthur City, Tex. Six thousand tons of steel will be required for the new structures. Smaller bridges are to be constructed across the Verdigris river at Afton, Okla., and at Frog Bayou at Mountainburg, Ark.

Railway Financial News.

Bellingham & Northern.—This is the name of the new company which has been incorporated in Washington with $1,200,000 stock to succeed the Bellingham Bay & British Columbia and the Bellingham Terminal & Railway, both subsidiaries of the Chicago, Milwaukee & Puget Sound.

Cairo & Thebes.—This road, running from Cairo to Thebes, Ill., was built, it was thought, originally for the Louisville & Nashville, but was leased to the St. Louis, Iron Mountain & Southern for 99 years from March 1, 1911. Judge Wright, in the United States district court, has now modified the lease so as to provide that the St. Louis & San Francisco and the St. Louis Southwestern may also use the terminals of the road upon application.

Canadian Pacific.—This company is to apply for an order in council sanctioning the 999-year lease of the Quebec Central by the Canadian Pacific, dated January 1, 1913. The directors of both companies have previously approved the lease.

Chesapeake & Ohio.—At the annual meeting in Richmond, this week, Frederick H. Rawson, of Chicago, was elected a director in place of Thomas H. Hubbard.

Chicago & Eastern Illinois.—The New York Stock Exchange has listed $5,031,000 purchase money first lien 5 per cent. coal bonds, issued as follows: $2,680,000 for coal lands in Sullivan county, Ind., and Montgomery county, Ill.; $1,826,000 for the coal lands of the Peabody Coal Company, the Oak Hill Coal & Mining Company and the Vigo & Vermillion Mining Company, all in Illinois; and $525,000 for locomotives, mine locomotives, and cars and mine machinery.

Chicago, Milwaukee & Puget Sound.—See Bellingham & Northern.

Cincinnati-Nashville Southern.—See Tennessee, Kentucky & Northern.

Denver, Laramie & Northwestern.—The receiver has been authorized to issue $50,000 receivers' certificates, of the proceeds of which $20,000 is to be used to take up notes which were given to raise money to meet the payrolls when the receiver first took charge.

Florida East Coast.—The directors have declared 2½ per cent. interest, payable November 1, 1912, on the $20,000,000 general mortgage income 5 per cent. bonds. In 1911 4 per cent. was paid, and in 1910 3½ per cent.

Grand Trunk.—Blair & Company, New York, are offering $3,360,000 4½ per cent. equipment notes, series B, dated November 1, 1912, due semi-annually beginning May 1, 1913. The notes are issued in part payment for 100 locomotives, 2,000 box cars and 50 tank cars.

Kansas City, Mexico & Orient.—Charles S. Jobes has been appointed co-receiver, with Charles A. Young, for the International Construction Company and the Union Construction Company, which companies were building the Kansas City, Mexico & Orient, and which went into the hands of the receiver at the same time that the railroad did.

Lorain, Ashland & Southern.—This company has asked the Ohio public service commission for permission to issue $1,750,000 stock, $1,500,000 first mortgage 5 per cent. 50-year bonds, and $1,200,000 second mortgage bonds. The road now has outstanding $250,000 stock.

Quebec Central.—See Canadian Pacific.

St. Joseph & Grand Island.—Stockholders on October 15 postponed action looking toward the approval of the new $15,000,000 mortgage. This is due to an injunction obtained by the minority stockholders against the majority stockholders. (The Union Pacific.)

Tennessee, Kentucky & Northern.—Stockholders are to vote on December 20 on the question of leasing the Cincinnati-Nashville Southern, which took over the line running from Allgood to Livingston, Tenn., 21 miles, at foreclosure sale in August, 1912.

Union Pacific.—See St. Joseph & Grand Island.

[ADVERTISEMENT.]

ANNUAL REPORT

THE CHICAGO, ROCK ISLAND & PACIFIC RAILWAY COMPANY—THIRTY-SECOND ANNUAL REPORT.

FISCAL YEAR ENDED JUNE 30, 1912.

To the Stockholders:

The Board of Directors herewith submit their report of the operations and affairs of the Rock Island Lines for the fiscal year ended June 30, 1912. The results of the operations for the year were as follows:

Total operating revenue (decrease $3,774,619.72, or 5.5 per cent.)	$64,712,853.32	
Operating expenses (decrease $2,296,188.99, or 4.7 per cent.	46,759,494.01	
Net operating revenue (decrease $1,478,430.73, or 7.6 per cent.)		$17,953,359.31
Taxes (increase $44,210.27, or 1.6 per cent.)		2,752,861.23
Operating income		$15,200,498.08
Miscellaneous income		686,790.83
Total income		$15,887,288.91
Interest and rentals		12,036,892.99
Balance of income, after providing for all charges, being 5.1 per cent. on capital stock ($75,000,000.00)		$3,850,395.92
Dividends paid (5 per cent. on capital stock)		3,743,760.00
Balance surplus for the year		$106,635.92

For comparative income account in detail, see table on page 13.

CAPITAL STOCK.

The capital stock outstanding June 30, 1912, was $74,877,200.00; no change having occurred during the current fiscal year.

FUNDED DEBT.

The funded debt, not including equipment notes, increased $22,439,600.00 during the period under review and equipment notes decreased $1,412,000.00, creating a net increase in the total funded debt of $21,027,600.00.

ROAD AND EQUIPMENT.

The property investment increased $3,449,579.89 during the year, which figure includes the cost of new equipment purchased under trust agreement or otherwise acquired, and expenditures for additions and betterments.

NEW LINES ACQUIRED.

Under date of October 14, 1911, the Rock Island, Arkansas and Louisiana Railroad Company purchased that portion of the Little Rock and Hot Springs Western Railroad extending from Little Rock, Ark., to Benton, Ark., a distance of 21.97 miles, formerly operated under lease.

On December 1, 1911, The Chicago, Rock Island and Pacific Railway Company leased for a term of nine hundred ninety-nine years, the Rock Island & Dardanelle Railway Company, a branch line of railway, extending from Ola, Ark., to Dardanelle, Ark., a distance of 13.93 miles, and has included the mileage, revenues, operating expenses, taxes, etc., in its accounts. By reason of the length of the terms of the lease, the mileage is considered owned in figuring all statistics.

NEW EQUIPMENT.

The 60 steel passenger train cars mentioned in last year's report have been received and placed in service.

Orders were also placed during the current fiscal year for 50 locomotives, 2 steel passenger motor cars, 51 steel passenger train cars (including 4 horse cars and 1 business car) and 4,940 steel underframe freight train cars, of which 10 locomotives and 622 freight train cars have been delivered; the balance, consisting of 40 locomotives, 4,318 freight train cars, and 51 steel passenger train cars and two steel passenger motor cars are to be delivered after June 30, 1912.

CONSTRUCTION OF NEW LINES.

The construction of the St. Paul and Kansas City Short Line Railroad between Carlisle, Iowa, and Allerton, Iowa (mention of which was made in last year's report), is now well under way, about eighty-five per cent. of the grading, and about eighty per cent. of the bridging having been completed at June 30, 1912.

Twenty-two miles of rail had been laid to October 1, 1912, and the laying of the balance is rapidly progressing.

The details of the building of this line are in accordance with the most modern ideas of railroad construction; new ninety-pound rail on creosoted ties, with the latest design of rail fastenings; track ballasted with gravel; concrete posts for right of way fence; public highways diverted wherever possible, either under or over the rails, etc.

Under date of June 3, 1911, a charter was granted, under the laws of the State of Arkansas, to the Malvern and Camden Railway Company, with authorized capital stock of $1,300,000.00, of which $420,000.00 has been issued and is owned by your company.

It is proposed to construct a line of railway, approximately sixty miles long, from the City of Malvern, Hot Spring County, Arkansas, in a southerly direction through the counties of Hot Spring, Dallas and Ouachita to the City of Camden, Ouachita County, Arkansas.

At the close of this fiscal year about forty-five per cent, of the grading and bridging was completed. Track laying will begin about November 1, 1912.

The line, when completed, will traverse a rich lumber section, and also furnish additional service for the cities of Malvern and Camden, with populations of about three thousand each.

To enable that company to meet its construction obligations, your company has advanced $297,097.92 to the Malvern and Camden Railway Company.

GENERAL.

The records of the industrial department indicate that one hundred and twenty-eight new industries were located along the Rock Island Lines during the current fiscal year. It is estimated that their construction will cost approximately thirteen million dollars and that their operation will furnish employment for more than five thousand men and create an annual movement of over fifty-four thousand carloads of revenue freight. These industries will also require the movement of considerable less than car load freight.

During the year seventy-three industrial side tracks were constructed to private industries and four to coal mines, making a total of seventy-seven new tracks. Extensions and re-arrangements of tracks were also made to twelve industries and three coal mines.

The policy of improving the terminals of your property has been carried forward during the year. For improving and creating new terminals, the sum of $1,163,955.39 was expended.

In addition to the above expenditures, $664,333.08 was advanced to the Arkansas and Memphis Railway Bridge and Terminal Company for the purpose of purchasing a bridge site and land for terminals at Memphis, Tenn., in connection with the construction of a bridge across the Mississippi River at that point.

Advances aggregating $418,603.23 during the period covered by this report were also made to the Trinity and Brazos Valley Railway Company, covering one-half of the expenditures for additions and betterments, equipment and operating deficit of that company.

In order to promote the safety of employes and patrons and to reduce to a minimum, personal injuries, there was organized on August 1st 1912, a safety bureau with jurisdiction over the entire Rock Island Lines. The organization embraces practically every operating official, together with minor officers and employes, and it is hoped that by co-operation of all concerned, a large percentage of accidents will be avoided.

Taxes continue to show an increase. The increase for the period under review, compared with the same period last year, was $44,210.27 or 1.6 per cent. However, in making a five year comparison, the account shows an increase of $962,966.44 or 53.80 per cent., while the operated mileage has increased during the same period less than one per cent.

At June 30th, 1912, one hundred and thirty-three pensioners were on the pension pay-rolls, ninety-five employes having been retired by reason of the age limit, and thirty-eight by reason of being incapacitated. The total cost for pensions paid and the expense of administration during the year was $41,807.30.

In common with other railroads, the gross revenue of your Company decreased, and the expenses of operation increased, as compared with the preceding fiscal year. The almost unparalleled weather conditions during the winter of 1911-1912, and the extraordinary flood conditions in the Spring of 1912, during which latter period, some forty miles of the track of your Company were under water for a period of more than two weeks, made both for an increase in expenses and decrease in earnings. These conditions, together with the fact that the expenses for the year carry a charge of $342,000 on account of increased rates of pay in employes' wages, as compared with the preceding year, made it impossible to keep operating expenses down to a level proportionate to the earnings, consequently causing an increase in the operating ratio.

As stated in previous reports, the accounts of your company are handled in accordance with methods prescribed and enforced by the Interstate Commerce Commission, and are periodically audited by their examiners, therefore, it is deemed unnecessary to have the accounts certified by an independent auditor.

It is a pleasure to acknowledge the loyalty and hearty co-operation of officers and employes.

By order of the Board of Directors,

H. U. MUDGE,
President.

October 21, 1912.

INCOME ACCOUNT.

YEAR ENDED JUNE 30, 1912, COMPARED WITH PREVIOUS YEAR.

	1911-12.	1910-11.	Increase or Decrease. Amount.	Per Cent.
Average mileage operated	8,035.84	8,026.09	9.75	.12
Revenue from transportation:				
Freight	$41,156,834.72	$43,368,395.66	—$2,211,560.94	5.10
Passenger	18,609,408.36	20,240,528.03	—1,631,119.67	8.06
Mail	1,602,209.29	1,577,219.40	24,989.89	1.58
Express	2,014,386.03	2,053,549.44	—39,163.41	1.91
Miscellaneous	873,417.38	800,107.57	73,309.81	9.16
Total transportation revenue	$64,256,255.78	$68,039,800.10	—$3,783,544.32	5.56
Revenue from operations other than transportation	456,597.54	447,672.94	8,924.60	1.99
Total operating revenue	$64,712,853.32	$68,487,473.04	—$3,774,619.72	5.51
Operating expenses:				
Maintenance of way and structures	$8,493,345.86	$9,738,015.96	—$1,244,670.10	12.78
Maintenance of equipment	8,302,466.70	9,359,748.70	—1,057,282.00	11.26
Traffic expenses	1,981,398.97	2,007,149.52	—25,750.55	1.28
Transportation expenses	26,210,502.08	26,171,418.77	39,083.31	.15
General expenses	1,771,780.40	1,779,350.05	—7,569.65	.43
Total operating expenses	$46,759,494.01	$49,055,683.00	—$2,296,188.99	4.68
Net operating revenue	$17,953,359.31	$19,431,790.04	—$1,478,430.73	7.60
Taxes	2,752,861.23	2,708,650.96	44,210.27	1.63
Operating income	$15,200,498.08	$16,723,139.08	—$1,522,641.00	9.10

Outside operations (debit balance)	*$196,976.63*	*$115,725.63*	—$81,251.00	70.21
Hire of equipment (debit balance)	*990,827.67*	*1,273,767.61*	282,939.94	22.21
Other income	1,874,595.13	1,574,970.30	299,624.83	19.03
Total	$686,790.83	$185,477.06	$501,313.77	270.28
Total income	$15,887,288.91	$16,908,616.14	—$1,021,327.23	6.04
Interest	$10,492,134.63	$9,741,852.72	$750,281.91	7.70
Rentals	1,544,758.36	1,704,925.05	—160,166.69	9.39
Betterments on leased lines	.....	19,124.71	—19,124.71	100.00
Total charges	$12,036,892.99	$11,465,902.48	$570,990.51	4.98
Balance of income (available for dividends) ...	$3,850,395.92	$5,442,713.66	—$1,592,317.74	29.26
Dividends	3,743,760.00	3,930,948.00	—187,188.00	4.76
Balance surplus (carried to credit of profit and loss)	$106,635.92	$1,511,765.66	—$1,405,129.74	92.95

DIVIDENDS DECLARED DURING YEAR ENDED JUNE 30, 1912.

Dividend No. 125, 1¼ per cent. paid September 30, 1911....	$935,940.00
Dividend No. 126, 1 per cent. paid December 30, 1911.....	748,752.00
Dividend No. 127, 1¼ per cent. paid March 30, 1912.....	935,940.00
Dividend No. 128, 1½ per cent. paid June 29, 1912.....	1,123,128.00
Total, 5 per cent.	$3,743,760.00

PROFIT AND LOSS.

Credit balance, June 30, 1911.....			$17,008,302.69
Surplus for year ended, June 30, 1912.....		$106,635.92	
Interest prior to current fiscal year on advances for construction		13,684.93	
Profit on purchase of scrip and warrants used in payment of taxes.....		2,623.55	
Sundry adjustments not affecting current year's income		69,249.72	
		$192,194.12	
Less:			
Loss on securities and land sold..	$81,104.29		
Losses through failures of railroads and individuals	50,039.43		
Unextinguished discount on securities	1,637,500.00		
Miscellaneous adjustments	118,789.01		
	$1,887,432.73		
Depreciation on:			
Tracks removed	$51,263.17		
Structures sold, removed or destroyed	29,725.55		
Equipment sold, dismantled or destroyed	633,991.39	714,980.11	2,602,412.84	2,410,218.72
Credit balance, June 30, 1912.....				$14,598,083.97

CONDENSED GENERAL BALANCE SHEET.

JUNE 30, 1912, AND COMPARISON WITH PREVIOUS YEAR.

ASSETS.	1912.	1911.	Increase or Decrease.
Property investment:			
Road and Equipment:			
Investment to June 30, 1907	$255,585,343.24	$255,585,343.24	.....
Investment since June 30, 1907	31,610,476.77	28,160,896.88	$3,449,579.89
Reserve for accrued depreciation—credit	*609,043.31*	*470,618.86*	—138,424.45
Total road and equipment	$286,586,776.70	$283,275,621.26	$3,311,155.44
Securities:			
Securities of proprietary, affiliated and controlled companies—pledged ...	180,233.16	99,504.00	80,729.16
Securities of proprietary, affiliated and controlled companies—unpledged...	7,044,138.42	8,966,521.52	—1,922,383.10
Other investments:			
Advances to proprietary, affiliated and controlled companies for construction, equipment and betterments	8,873,117.75	7,041,287.21	1,831,830.54
Miscellaneous investments	2,471,175.52	2,258,858.07	212,317.45
Total property investment	$305,155,441.55	$301,641,792.06	$3,513,649.49
Working assets:			
Cash	$15,073,939.94	$3,241,991.16	$11,831,948.78
Securities issued or assumed—held in treasury	557,458.23	4,758.23	552,700.00
Marketable securities	15,946,140.08	15,955,932.87	—9,792.79
Loans and bills receivable..	484,567.43	456,522.76	28,044.67
Traffic and car-service balances due from other companies	652,253.82	398,354.26	253,899.56
Net balance due from agents and conductors	1,058,584.79	1,041,406.29	17,178.50
Miscellaneous accounts receivable	3,284,397.25	3,222,814.22	61,583.03
Materials and supplies.....	5,934,979.99	5,813,008.40	121,971.59
Other working assets.....	1,845,871.15	1,387,350.35	458,520.80
Total working assets.....	$44,838,192.68	$31,522,138.54	$13,316,054.14
Accrued income not due:			
Unmatured interest, dividends and rents receivable.....	$656,656.94	$507,640.25	$149,016.69
Deferred debit items:			
Advances	$2,799,127.71	$1,864,213.75	$934,913.96
Rents and insurance paid in advance	33,772.60	56,479.94	—22,707.34
Special deposits	227,610.98	417,622.86	—190,011.88
Other deferred debit items.	1,198,571.28	1,213,559.53	—14,988.25
Total deferred debit items	$4,259,082.57	$3,551,876.08	$707,206.49
Grand total	$354,909,373.74	$337,223,446.93	$17,685,926.81

LIABILITIES.	1912.	1911.	Increase or Decrease.
Stock:			
Capital stock	$75,000,000.00	$75,000,000.00	.....
Mortgage, bonded and secured debt:			
Funded debt	251,189,600.00	230,162,000.00	$21,027,600.00
Total capital liabilities...	$326,189,600.00	$305,162,000.00	$21,027,600.00
Working liabilities:			
Traffic and car-service balances due to other companies	$917,345.51	$940,932.30	—$23,586.79
Audited vouchers and wages unpaid	3,703,690.95	5,042,603.29	—1,338,912.34
Miscellaneous accounts payable	292,048.29	239,813.50	52,234.79
Matured interest, dividends and rents unpaid.....	2,235,041.25	1,980,352.26	254,688.99
Matured mortgage, bonded and secured debt unpaid.	23,000.00	23,000.00	.....
Working advances due to other companies	190,620.30	213,101.29	—22,480.99
Other working liabilities...	1,002,748.53	818,638.44	184,110.09
Total working liabilities..	$8,364,494.83	$9,258,441.08	—$893,946.25
Accrued liabilities not due:			
Unmatured interest, dividends and rents payable..	$2,425,223.42	$1,872,923.87	$552,299.55
Taxes accrued	1,317,869.45	1,371,588.74	—53,719.29
Total accrued liabilities not due	$3,743,092.87	$3,244,512.61	$498,580.26
Deferred credit items:			
Operating reserves	$1,007,518.39	$952,868.86	$54,649.53
Other deferred credit items.	942,215.92	1,532,953.93	—590,738.01
Total deferred credit items	$1,949,734.31	$2,485,822.79	—$536,088.48
Grand total liabilities....	$340,246,922.01	$320,150,776.48	$20,096,145.53
Appropriated surplus:			
Additions to property since June 30, 1907, through income	64,367.76	64,367.76	.....
Profit and loss:			
Balance	$14,598,083.97	$17,008,302.69	—2,410,218.72
Grand total	$354,909,373.74	$337,223,446.93	$17,685,926.81

Note.—In stating the assets and liabilities of the companies forming the Rock Island Lines, the holdings of The Chicago, Rock Island and Pacific Railway Company in the bonds and capital stock of the auxiliary lines, together with loans between the various companies, have been eliminated from the liabilities and a like reduction made in the assets pertaining thereto; the figures shown, therefore, represent the book value of the assets and the liabilities without duplication.

ROAD AND EQUIPMENT—INVESTMENT SINCE JUNE 30, 1907.

CHANGES DURING YEAR ENDED JUNE 30, 1912.

Balance, June 30, 1911, as per balance sheet		$28,160,896.88
CHANGES DURING THE YEAR:		
Additions:		
Additions and betterments, current year (not including equipment)	$3,282,603.30	
Expenditures for additional and improved equipment:		
Converting coal burning locomotives into oil burners	$13,523.66	
Freight, insection and miscellaneous charges in connection with purchase of new ballast cars	7,730.88	
Converting steam shovel 95256 into derrick car	996.73	
New appliances for existing equipment, required by Federal and state laws	26,133.70	
Other new appliances for existing equipment	16,105.66	
Silverware for dining and cafe cars	3,232.44	67,723.07
Total additions and betterments		$3,350,326.37
Acquisition of Little Rock and Hot Springs Western Railroad by Rock Island, Arkansas and Louisiana Railroad Company		453,600.00
Disbursements for construction of Malvern and Camden Railway (property of Rock Island, Arkansas and Louisiana Railroad Company)		297,097.92
Additions and betterments on leased lines		20,199.28
Bankers Trust Company of New York, equipment purchase under indenture of August 1, 1911		402,431.93
Disbursements for old construction liabilities of Rock Island, Arkansas and Louisiana Railroad Company		1,217.67
Net adjustment of charges, Yarnall, Texas, to Amarillo, Texas line		2,595.44
		$4,527,468.61
Deductions:		
Bankers Trust Company of New York, equipment purchase under indenture of May 2, 1910—Credit from material furnished equipment builders	$253,559.82	
Reserve for replacement of destroyed equipment which, under mortgages and equipment trust agreements, must be replaced	31,236.77	
Value of equipment destroyed, dismantled or sold during the past fiscal year (exclusive of equipment which, under mortgages or equipment trust agreements, must be replaced). Such value, less salvage, was charged to operating expenses and profit and loss	790,940.00	
Net amount of miscellaneous adjustments covering equipment purchased under car trust agreements, prior to the current fiscal year	2,122.13	
Sale of lots eight and nine in block seven, Quitman, La. (property of Rock Island, Arkansas and Louisiana Railroad Company)	30.00	1,077,888.72
Net increase		3,449,579.89
Balance, June 30, 1912, as per balance sheet		$31,610,476.77

EXPENDITURES FOR ADDITIONS AND BETTERMENTS.

YEAR ENDED JUNE 30, 1912.

Right of way and station grounds	$159,782.32	
Real estate	*554.50*	
Widening cuts and fills	123,752.06	
Protection of banks	45,609.07	
Grade revisions and changes of line	3,519.87	
Bridges, trestles and culverts	245,047.59	
Increased weight of rail	76,782.17	
Improved frogs and switches	17,099.17	
Track fastenings and other material	190,644.76	
Ballast	737,594.75	
Additional main tracks	13,203.24	
Sidings and spur tracks	172,484.56	
Terminal yards	100,336.60	
Fencing right of way	30,328.50	
Improvement of over and under grade crossings	*4,067.38*	
Track elevation, elimination of grade crossings, etc.	343,996.79	
Interlocking apparatus	7,310.35	
Block and other signal apparatus	10,724.03	
Telegraph and telephone lines	39,537.78	
Station buildings and fixtures	404,821.75	
Roadway machinery and tools	2,235.00	
Shops, engine houses and turn tables	131,580.04	
Shop machinery and tools	3,767.33	
Water and fuel stations	81,930.29	
Grain elevators and storage warehouses	91,023.25	
Dock and wharf property	2,291.52	
Electric light and power plants	199,953.67	
Electric-power transmission	1,410.77	
Miscellaneous structures	22,145.45	
Interest and commissions	28,312.50	$3,282,603.30
**Equipment:*		
Steam Locomotives	$39,742.94	
Passenger train cars	16,101.78	
Freight train cars	2,718.29	
Work equipment	8,727.61	
Floating equipment	432.45	67,723.07
Total additions and betterments		**$3,350,326.37**

The above amount was expended by the following companies:

The Chicago, Rock Island and Pacific Railway Company	$3,259,631.62	
The Chicago, Rock Island and Gulf Railway Company	58,145.93	
Rock Island, Arkansas and Louisiana Railroad Company	32,548.82	$3,350,326.37

Expenditures for additions and betterments were also made by the following subsidiary companies:

Rock Island Improvement Company	$87,684.56	
Keokuk and Des Moines Railway Company (leased line)	19,744.56	
†Little Rock and Hot Springs Western Railroad Company (leased line)	454.72	107,883.84
Total expenditures by all companies during the year		$3,458,210.21

* Alsto described elsewhere.

† Purchased by The Rock Island, Arkansas and Louisiana Railroad Company October 14, 1911 and these charges incurred prior to that date.

Figures in *italics* denote credits.

FREIGHT TRAFFIC STATISTICS.

YEAR ENDED JUNE 30, 1912, COMPARED WITH PREVIOUS YEAR.

	1911-12	1910-11	INCREASE	DECREASE
Revenue per ton mile	$.0089	$.0092	.....	$.0003
Revenue per ton	$2.170	$2.268	.....	$.098
Revenue per train mile	$2.486	$2.479	$.007	.....
Revenue per car mile (excludes caboose car miles)	$.0969	$.0965	$.0004	.....
Revenue per mile of road	$5,121.66	$5,403.43	.....	$281.77
Number of tons per train mile—revenue freight	277.81	269.66	8.15	.....
Number of tons per train mile—company freight	51.97	50.26	1.71	.....
Number of tons per train mile—all freight	329.78	319.92	9.86	.....
Number of tons per loaded car mile—revenue freight	15.11	14.92	.19	.....
Number of tons per loaded car mile—company freight	2.83	2.78	.05	.....
Number of tons per loaded car mile—all freight	17.94	17.70	.24	.....
Number of tons per loaded and empty car mile—revenue freight	10.83	10.49	.34	.....
Number of tons per loaded and empty car mile—company freight	2.03	1.96	.07	.....
Number of tons per loaded and empty car mile—all freight	12.86	12.45	.41	.....
Number of cars per train—loaded	18.36	18.05	.31	.....
Number of cars per train—empty	7.25	7.61	.....	.36
Number of cars per train—all	25.61	25.66	.....	.05
Average haul per ton—revenue freight (in miles)	242.46	246.80	.....	4.34
Average haul per ton—company freight (in miles)	135.64	139.05	.....	3.41
Average haul per ton—all freight (in miles)	215.69	220.02	.....	4.33
Average ton miles of revenue freight per mile operated	572,340	587,890	.....	15,550

PASSENGER TRAFFIC AND PER MILE OF ROAD STATISTICS.

YEAR ENDED JUNE 30, 1912, COMPARED WITH PREVIOUS YEAR.

PASSENGER TRAFFIC:	1911-12	1910-11	INCREASE	DECREASE
Revenue per passenger mile	$.0198	$.0200	.....	$.0002
Revenue per passenger	$.983	$1.020	.....	$.037
Revenue per train mile (excluding mail, express, etc.)	$.975	$1.100	.....	$.125
Revenue per train mile (including mail, express, etc.)	$1.179	$1.312	.....	$.133
Revenue per car mile (cars carrying passengers)	$.261	$.292	.....	$.031
Revenue per mile of road (excluding mail, express, etc.)	$2,315.80	$2,521.84	.....	$206.04
Revenue per mile of road (including mail, express, etc.)	$2,802.16	$3,009.37	.....	$207.21
Number of passengers per train mile	49.21	54.91	.....	5.70
Number of passengers per car mile (cars carrying passengers)	13.16	14.55	.....	1.39
Average distance carried (in miles)	49.63	50.90	.....	1.27
Number of cars per train	5.28	5.32	.....	.04
Average miles of revenue passengers per mile operated	116,900	125,844	.....	8,944
PER MILE OF ROAD:				
Total operating revenue	$8,053.03	$8,533.11	.....	$480.08
Operating expenses	5,818.87	6,112.03	.....	293.16
Net operating revenue	$2,234.16	$2,421.08	.....	$186.92
Taxes	342.57	337.48	$5.09	.....
Operating income	$1,891.59	$2,083.60	.....	$192.01
Outside operations (debit balance)	*24.51*	*14.42*	*$10.09*	.....
Hire of equipment (debit balance)	*123.30*	*158.70*	.....	*35.40*
Other income	233.28	196.23	37.05	.....
Total income	$1,977.06	$2,106.71	.....	$129.65

Interest	$1,305.67	$1,213.77	$91.90	.....
Rentals	192.23	212.42	.....	$20.19
*Betterments on lines leased from other companies	.....	2.38	.....	2.38
Total charges	$1,497.90	$1,428.57	$69.33	.....
Balance of income (available for dividends)	$479.16	$678.14	.....	$198.98
†Betterments on lines leased from other companies, per mile of the leased roads so improved	.....	$103.78	.....	$103.78

* Used average miles operated same as for other computations.

† Covers Keokuk and Des Moines Railway and Little Rock and Hot Springs Western Railroad.

Effective July 1, 1911, additions and betterments on leased lines are charged to property account.

MAINTENANCE OF WAY AND STRUCTURES—REMARKS

YEAR ENDED JUNE 30, 1912.

The following is a comparative statement of miles of the first track main lines (as distinguished from branch lines) owned or leased, not including trackage rights, which are used in the rail and ballast tables given below:

	June 30 1912	June 30 1911
Chicago, Ill., to Colorado Springs, Colo.	1,063.09	1,063.09
Davenport, Ia., to Dallas, Tex. (via Kansas City)	833.61	833.61
Herington, Kan., to Santa Rosa, N. M.	526.92	526.92
Burlington, Ia., to Minneapolis, Minn.	307.58	307.58
Altamont, Mo., to North Topeka, Kan. (via St. Joseph)	137.91	137.91
McFarland, Kan., to Belleville, Kan.	103.19	103.19
Memphis, Tenn., to Tucumcari, N. M.	869.87	869.87
Biddle, Ark., to Eunice, La.	292.64	292.64
St. Louis, Mo., to Kansas City, Mo.	283.90	283.90
	4,418.71	4,418.71

Improvements to roadway have been made as follows:

Ties were renewed to the extent of 1,753,231 or an average of 229 per mile of first, second and third main track owned and leased: of these ties, 1,402,295 were treated with creosote.

Track miles of new ballast	153.63 miles
Track miles reballasted	309.92 miles
Miles of roadbed widened to standard width	155.55 miles
Road miles of new right of way fence built	47.41 miles
Linear feet, transversely to track, of concrete arch culverts built	3,479 feet
Linear feet, transversely to track, of iron pipe culverts built	9,057 feet
Linear feet, transversely to track, of vitrified pipe culverts built	403 feet
Linear feet of timber bridges or trestles replaced with steel, concrete or masonry bridges	1,122 feet
Linear feet of bridges and trestles filled	14,992 feet
Linear feet of iron or steel bridges replaced with heavier structures	1,605 feet
Linear feet of new pile trestles built	2,621 feet
Linear feet of new steel bridges built	436 feet

In addition to the above, 4,655 linear feet of pile trestle and 75 linear feet of steel bridge were acquired with the Rock Island and Dardanelle Railway.

The following table shows the aggregate length and nature of bridges at June 30, 1912, compared with previous year:

Bridges	Total (feet)	Kind of bridge and length (in feet) of each kind: Steel and iron	Combination (wood and masonry)	Combination (wood and iron)	Wooden	Trestles
Main track, June 30, 1912.	506,048	151,123	891	912	2,282	350,840
Per cent. of total length	.....	29.86	.18	.18	.45	69.33
Main track, June 30, 1911.	514,081	149,821	891	1,488	2,385	359,496
Per cent. of total length	.....	29.14	.17	.29	.47	69.93

The average expense of maintenance of way and structures per mile of first, second and third main track owned and leased during the past fiscal year was $1,072.10 as against $1,246.11 last year.

The average expense of maintenance of way and structures per mile of first main track owned and leased for the fiscal year ended June 30, 1912, was $1,114.40, compared with $1,295.33 for the previous year.

All the rail relaid during the year has replaced lighter weight, and a corresponding increase in metal has been made in appliances.

COMPARATIVE STATEMENTS OF RAIL AND BALLAST IN MAIN AND BRANCH LINES OWNED OR LEASED AS OF JUNE 30, 1911 AND 1912.

	Rail	Total miles owned or leased	Weight per yard and miles of each weight: 100	85	80	Re-rolled 80	70	65-6-7-8	60	56-8	52 and under
	Main lines										
1912	First track	*4,418.71	70.98	1,229.86	1,886.88	246.73	36.37	607.76	340.13	.....	.....
	Second track	267.34	36.43	148.94	78.04	.....	3.93	.....	.....	.....	.....
	Third track	8.01	.....	.....	1.31	.....	6.70	.....	.....	.....	.....
	Total	4,694.06	107.41	1,378.80	1,966.23	246.73	47.00	607.76	340.13	.....	.....
	Per cent. of main lines	.....	2.29	29.37	41.89	5.25	1.00	12.95	7.25	.....	.....
1911	First track	*4,418.71	61.85	1,124.58	1,961.23	225.28	49.51	652.26	334.97	9.03	.....
	Second track	267.34	32.02	149.04	82.35	.....	3.93	.....	.....	.....	.....
	Third track	8.01	.....	.....	0.39	.....	7.62	.....	.....	.....	.....
	Total	4,694.06	93.87	1,273.62	2,043.97	225.28	61.06	652.26	334.97	9.03	.....
	Per cent. of main lines	.....	2.00	27.13	43.54	4.80	1.30	13.90	7.14	.19	.....
	Branch lines										
1912	First track	3,002.54	.....	24.74	268.27	37.65	338.91	304.84	1,184.75	580.42	262.96
	Second track	14.90	.....	5.02	1.83	.....	.16	.....	7.89	.....	.....
	Total	3,017.44	.....	29.76	270.10	37.65	339.07	304.84	1,192.64	580.42	262.96
	Per cent. of branch lines	.....	.....	.99	8.95	1.25	11.24	10.10	39.52	19.24	8.71
1911	First track	2,987.65	.....	24.41	265.25	12.48	349.87	304.32	1,182.91	583.80	264.61
	Second track	14.90	.....	5.02	1.83	.....	.16	.....	7.89	.....	.....
	Total	3,002.55	.....	29.43	267.08	12.48	350.03	304.32	1,190.80	583.80	264.61
	Per cent. of branch lines	.....	.....	.98	8.90	.42	11.66	10.13	39.66	19.44	8.81
1912	Total track	7,711.50	107.41	1,408.56	2,236.33	284.38	386.07	912.60	1,532.77	580.42	262.96
	Per cent. of total track	.....	1.39	18.27	29.00	3.69	5.00	11.83	19.88	7.53	3.41
1911	Total track	7,696.61	93.87	1,303.05	2,311.05	237.76	411.09	956.58	1,525.77	592.83	264.61
	Per cent. of total track	.....	1.22	16.93	30.03	3.09	5.34	12.43	19.82	7.70	3.44

	Ballast	Total miles owned or leased	Kind of ballast and miles of each kind: Rock	Burned Clay	Gravel	Cinder	Total	Sand or Dirt
	Main lines							
1912	First track	*4,418.71	1,371.45	565.37	1,435.33	318.04	3,690.19	728.52
	Second track	267.34	17.26	.....	219.28	27.80	264.34	3.00
	Third track	8.01	.....	.....	.39	7.62	8.01	.....
	Total	4,694.06	1,388.71	565.37	1,655.00	353.46	3,962.54	731.52
	Per cent. of main lines	.....	29.58	12.05	35.26	7.53	84.42	15.58
1911	First track	*4,418.71	1,290.77	523.52	1,360.59	364.36	3,539.24	879.47
	Second track	267.34	24.86	.....	209.91	29.57	264.34	3.00
	Third track	8.01	.....	.....	.39	7.62	8.01	.....
	Total	4,694.06	1,315.63	523.52	1,570.89	401.55	3,811.59	882.47
	Per cent. of main lines	.....	28.03	11.15	33.47	8.55	81.20	18.80
	Branch lines							
1912	First track	3,002.54	115.00	35.16	656.46	266.04	1,072.66	1,929.88
	Second track	14.90	.....	.....	.50	14.40	14.90	.....
	Total	3,017.44	115.00	35.16	656.96	280.44	1,087.56	1,929.88
	Per cent. of branch lines	.....	3.81	1.17	21.77	9.29	36.04	63.96
1911	First track	2,987.65	115.15	35.16	656.18	263.49	1,069.98	1,917.67
	Second track	14.90	.....	.....	.50	14.40	14.90	.....
	Total	3,002.55	115.15	35.16	656.68	277.89	1,084.88	1,917.67
	Per cent. of branch lines	.....	3.84	1.17	21.87	9.26	36.14	63.86
1912	Total track	7,711.50	1,503.71	600.53	2,311.96	633.90	5,050.10	2,661.40
	Per cent. of total track	.....	19.50	7.78	29.98	8.22	65.48	34.52
1911	Total track	7,696.61	1,430.78	558.68	2,227.57	679.44	4,896.47	2,800.14
	Per cent. of total track	.....	18.59	7.26	28.94	8.83	63.62	36.38

* See statement on next page, showing the miles which are classified as "**Main lines.**